THE ROLE OF AGRICULTURE IN THE ECONOMIC DEVELOPMENT OF JAMAICA

By

R. LESLIE BENNETT

Bachelor of Science

Oklahoma State University

Stillwater, Oklahoma

1967

Submitted to the Faculty of the Graduate College
of the Oklahoma State University
in partial fulfillment of the requirements
for the Degree of
MASTER OF SCIENCE
May, 1969

THE ROLE OF AGRICULTURE IN

THE ECONOMIC DEVELOPMENT

OF JAMAICA

L. A. Parcher
Thesis Adviser

Vernon R. Eedman

L. V. Rollins

D. D. Durham
Dean of the Graduate College

PREFACE

For all practical purposes, the economic development of Jamaica began with the discovery and mining of bauxite in the early 1950's. From that period to the present time the emphasis in Jamaica has been on industrial development while agriculture is neglected and thus remained in a subsistent state.

The primary objective of this study was to investigate the role that agriculture played in this economic development. The specific period is the intercensal period of 1954-1961. This investigation was done by analyzing the available data which though inadequate in many ways, had to be relied on heavily. The data are arranged and presented in the thesis eight chapters as follows:

In Chapter I, a brief background of both the history and the economy of Jamaica is given. Chapter II outlines the agricultural situation and presents the most recent available data on agriculture. The problems of agriculture are outlined in Chapter III. Chapter IV analyzed the agricultural marketing system to determine the role it played and can play in the marketing of domestic products.

Agricultural development is disscussed in Chapter V, with emphasis placed on the importance of a well designed plan. Chapter VI discusses the four contributions of agriculture to the economic development of Jamaica, while Chapter VII presents some projections of the level of supply and demand of selected agricultural products. Chapter VIII is

the concluding chapter. By using the projections and the demand and income elasticities presented in Chapter VII, recommendations for selected products are made and the implications analyzed.

The author wishes to express his deep appreciation to Dr. Loris A. Parcher, Graduate Committee Chairman, for his patience, supervision, assistance, and cooperation during both my graduate studies and in the writing of this thesis. I shall always be grateful to him for his concise attitude as my advisor and for the way he allowed me much freedom in accomplishing the objectives of this study.

Sincere gratitude is extended to Dr. G.P. Collins whose early assistance and encouragement were a great help in making this thesis possible. Appreciation is also due to Dr. Vernon R. Eidman for his meticulous help and suggestions in the final drafting of this thesis.

Others who have contributed significantly to this study are: Dr. Richard H. Leftwich, Dr. Luther G. Tweeten, and Dr. Darrell Kletke. Many thanks are extended to Mrs. Suzanne Moon for the typing of the final copy of this thesis. Her patience was inexhaustible.

I wish to express special thanks and sincere gratitude to my parents, Mr. and Mrs. R.I. Bennett, who gave me the initial encouragement and assistance. Their faith in me is unsurpassable. Lasting appreciation is due to my sister Valda, whose assistance from time to time was of tremendous help.

Finally, I am indebted to my wife Madge, for her help in many ways, not all of which can be adequately acknowledged here. I am most grateful to her for the arduous but elequant preparation of the draft of this thesis. She has paid a high price, in absence and in silence, for this

writing, and I cannot begin to speak of what I owe for her affection. It is to her that this thesis is dedicated.

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

LIST OF TABLES

LIST OF TABLES (Continued)

LIST OF TABLES (Continued)

LIST OF FIGURES

Exchange Rates

One pound sterling (£)	= 2.80 U.S. dollars
One shilling (s)	= .14 U.S. cents
One pence (d)	= 1.17 U.S. cents
BWI$1	= U.S. $0.583

All tonnage figures are in long tons (2,240 pounds) unless otherwise designated. Generally, in the tables, N.A. means not available and dashes are used to indicate zero.

CHAPTER I

Introduction

Agricultural development has been receiving increasing attention in recent years. Much of the discussion deals with ways in which the productivity of the agricultural sector may be increased. But, development implies changes in economic structures, thus changes in the relationship among the several sectors of the overall economy.

In a subsistence economy, most of the people are engaged in producing food and fiber for domestic consumption and they do not have the time, the ability, or the tools to produce other goods and services. By contrast, in a wealthy economy most of the people are engaged in producing goods and services other than for food or fiber and only a small proportion of the population is engaged in farming.

In a poor economy food is relatively expensive, so the average worker may have to spend two-thirds or more of his income for even a modest diet. In a wealthy economy, food costs are relatively low, requiring about one-fifth of the average family income for a diet that causes more of a problem of overweight than of malnutrition.

While there have been many studies on development, as such, little was found in the literature about the economic development of Jamaica. However, after careful research, some data were found which offered a useful basis for this thesis. Before discussing the specific objectives.

and the outline of this thesis, it is useful to give a brief background of the problem.

Historical Background[1]

Jamaica was discovered by Christopher Columbus in 1494 on his second voyage. After the discovery, the Spaniards used the island mainly as a strategic base for the conquest of the mainland of the Americas. The capture of Jamaica in 1655 changed its destiny and made it an outpost of British interests.

Sugar and slavery were the twin pillars of prosperity which made Jamaica one of the most valuable colonies in the world for almost a century and a half. The emancipation of the slaves in 1838 and the steady decline in sugar production replaced physical bondage with an economic decline. This led to an uprising in 1865 which was the turning point in Jamaican history.

For the first time, a Jamaican people showed its presence on the Jamaican scene. As a result, the House of Assembly, which consisted of the propertied classes -- 1800 electors out of a total of 450,000 inhabitants -- voted itself out of existence and made the island a Crown Colony through fear of further disturbances.

Between 1865 and 1938, the island was administered by Colonial Governors with little attention paid to major social problems (unemployment, housing, health, etc.). As a result, there were riots in 1938.

---

[1]Some of the material presented in this chapter is based on the booklet, Facts on Jamaica, published by the Jamaica Information Service, Kingston, Jamaica, 1967.

These riots were primarily directed against impossible economic and social conditions which had accumulated over many decades.

The granting of adult suffrage in 1944 gave the people the power to express their protest through the ballot box. It put the political seal on the new national awareness which had been the corollary of the economic protest riots of 1938.

The newly elected government was immediately faced with the problem of catching up with the back-log of problems inherited from the past. The gradual pragmatic approach to full political independence over the next two decades was accompanied by substantial advances on the economic and social fronts. After 307 years under the British rule Jamaica is now an independent country. This independence was obtained in August, 1962.

Although much has been achieved, shadows of the past still remain in grave and, as yet, unsolved problems: land erosion, an uneven system of land distribution, an adverse attitude towards the land and manual labor, an inadequate water supply system, widespread housing needs, insufficient medical services, and shortage of employment opportunities. Indeed, the political tradition of stability inherited from the British is a major asset in the fight to give urgently needed attention to chronic problems, whose solution requires programs which would entail a generation of efforts.

Jamaica is a member of the British Commonwealth and the Queen of Great Britain is the titular sovereign, a symbolic figure of unity without real power. The crown is represented by a Governor General chosen by the Crown on the advice of the Prime Minister. The Governor General's function, in addition to the symbolic and ceremonial, is to

act as final arbiter on matters concerning appointments and discipline in the Civil Service. The Governor General also exercises the Royal Prerogative of Pardon. In all these matters he is advised by a Privy Council.

The Executive comprises the Prime Minister who is the leader of the majority party, and ministers appointed by the Prime Minister. Together they form the Cabinet which is the highest executive power.

The Legislature is comprised of two chambers, an elected house and an appointed senate. The Executive is chosen from both chambers. As required by the Constitution, the leader of the minority party is the leader of the opposition. An Attorney General appointed by the Prime Minister is legal advisor to the Cabinet.

Geography

Situation and Size

Jamaica, 4,411 square miles, is the largest island in the British West Indies and the third largest of the Caribbean Islands. It measures 152 miles from east to west. Its greatest width is 52 miles from St. Ann's Bay in the north, to Portland Point in the south. Jamaica is 90 miles south of Cuba and 100 miles west of Haiti, the closest countries to it.

Origin of the Island

Jamaica belongs to the Central American region of the Western Hemisphere. The West Indian Islands are actually the summits of a submarine range of mountains which in prehistoric times perhaps formed

one large land mass connecting Central America to Venzuela in South America.

During the ages, vast changes took place in the region of the earth's crust. The island subsided beneath the sea. When it rose again, only the highest part of it appeared above the surface. It is one of the West Indian Islands, which have remained separate and distinct in South America.

Mountains

Apart from the coastal plains, averaging 10 miles wide, the island is mountainous with ridges above 5,000 feet. The highest point is the Blue Mountain Peak 7,402 feet above sea level.[2] The mountain ranges are composed of many mineral formations. Limestone is predominate, but marble, prophyry, alabaster, shales and sandstones are also prevalent.

The eastern part of the island is composed of igneous, sedimentary and metamorphic rocks which have been severely eroded by the many rivers so that the landscape is one of sharp-crested ridges and deep, twisting valleys.

Most of the rest of the island is capped by thick layers of white limestone. In the center and west this has been uplifted in stages to form several distinct plateau surfaces, though they have been considerably broken up by block faulting.

Streams seldom remain on the surface for long but disappear underground to flow through a maze of caverns reappearing only in the deeper

---

[2]See map on page 6 for physical features.

GEOLOGICAL MAP OF JAMAICA (based on Hill's Map)

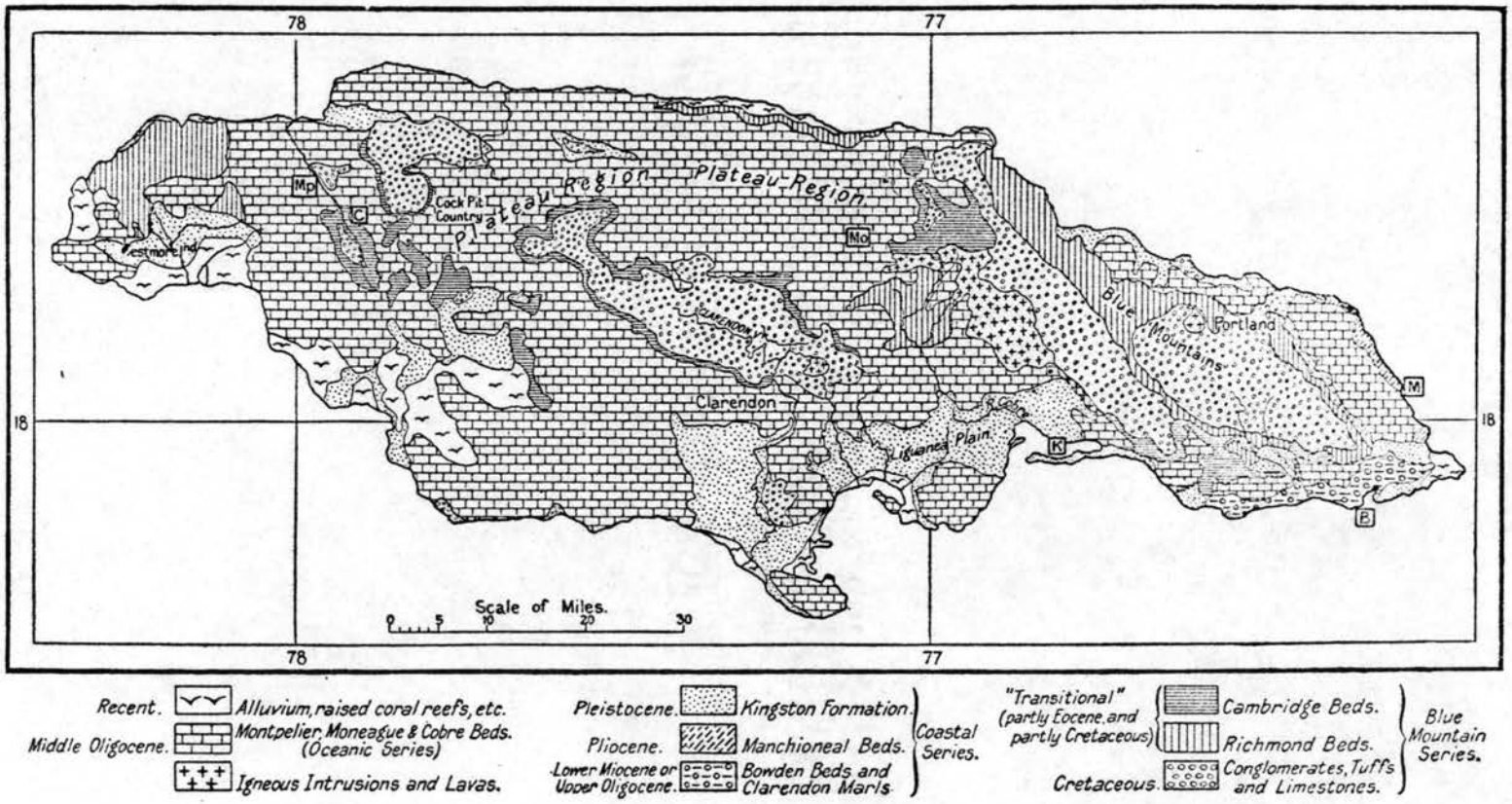

Figure 1. Physical Features of Jamaica

basins or at the edge of the limestones. Enormous quantities of limestones have been dissolved and in places the underlying rocks have been exposed.

Where limestones remain, as it still does over the largest portion of the island, the landscape varies from place to place. The Cockpit Country is so broken into deep, circular arenas and huge, rocky buttresses that it is almost impenetrable and is, therefore, sparsely populated. Elsewhere, erosion has produced a rolling upland countryside of rounded hills and hollows. Here conditions are better, though much of the land has had to be left in pasture and scattered clumps of trees. In general, poor soils and the difficulty of obtaining water make cultivation difficult. Dense agricultural settlement exists only where deep, rich soil has been deposited in large sedimentary basins.

Though it is not good for cultivation, limestone has other uses. It is good material for building and for roadmaking. Moreover, millions of years of tropical weathering have produced a residual redclay over much of its surface. In addition, this residual contains bauxite and is currently being mined by large mining companies.

Surrounding the highlands is a narrow coastal plain interrupted occasionally by spurs of highland reaching down to the sea. The largest lowland area is the southern plain which extends westward from Kingston into the parish of Clarendon. The plains are composed of mixed alluvial clays, sands and pebbles. Along parts of the coast, the sea has deposited material in the form of spits and bars. These types of land are suitable for agriculture.

Rivers

Most of the rivers are not navigable and the lay of the land causes them to run swiftly in deep beds, with their courses sometimes broken by waterfalls. The Black River, the largest river, is 44 miles long. Small inter-island cargo vessels can navigate it for 17 miles.

Climate

The temperature, conducive to the growth of all tropical crops, varies from 80° to 90° F to as low as 40° on the highest mountains. The monthly temperature range is small. Thus, in Kingston the difference between the hottest month, July (81.4° F) and the coolest, January (75.8° F) is less than 6° F. The diurnal range is somewhat greater (15° F to 20° F). It is rare for day temperatures on the plains to exceed 91° F or to fall below 60° F at night. Highland temperatures are 10° F to 20° F lower than on the plains, and the summits of the Blue Mountains have been known to have occasional light frost in winter. The lower temperature at higher elevations has some effect on the type of crops grown there; crops like Irish potatoes, strawberries and coffee come mainly from the higher parts of the island while coconuts and sugar cane are produced in the lowlands.

Rainfall[3]

The average rainfall in Jamaica is about 80 inches. The rainy season begins at about the end of April with a somewhat drier intervening

---

[3] See map on page 9.

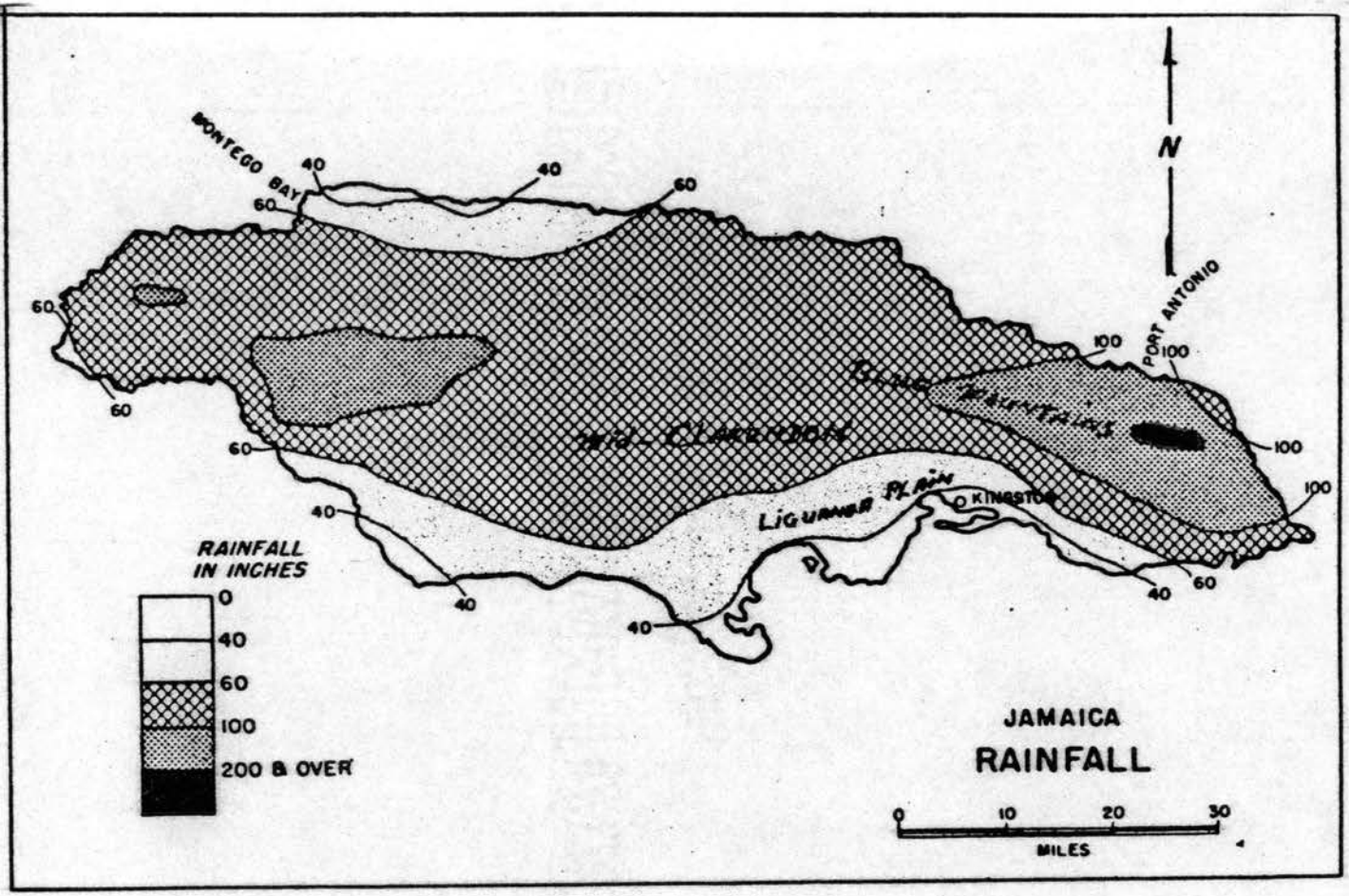

Figure 2. Rainfall of Jamaica.

period in June and reaches a maximum in September, October, and November.

The tendency for drought is partly offset by occasional winds blowing out from North America in winter. They bring with them cool, damp conditions lasting from one to several days.

As the prevailing winds blow from the north and east, the northward and eastward-facing parts of Jamaica receive more rain than the south. The Blue Mountains (which run east and west through the entire length of the island) exert a marked influence on rainfall distribution in eastern Jamaica. Their summits, usually enveloped in clouds, have over 200 inches of rain a year. The northeast coast has over 100 inches but the southeast coast and the Liguanea Plain are cast in rain shadow and some parts receive less than 35 inches annually. Thus, the largest lowland has the least rain and irrigation is necessary if crops are to be grown successfully. The most recent irrigation work has been carried out in mid-Clarendon where 12,000 acres now obtain water from underground wells.

Although about 50,000 acres are irrigated in Jamaica, sugar cane, citrus, rice and bananas benefit the most. The southeast also has the longest and most severe dry season. Streams flowing down the southern slopes of the Blue Mountains are reduced to mere trickles of water most of the time and may dry up altogether.

Land Use

The mountainous nature of the country, half of which lies above 1,000 feet, the steep, rocky slopes and the large tracts of poor, thin soils are the chief natural factors accounting for the high proportion

of unproductive land in Jamaica. But, man has also done much to reduce the productivity of the country. Large forest areas have been cut for lumber, burned for charcoal and cleared for cultivation, thus exposing the land to rapid tropical weathering. Plantations established in unsuitable areas in slave days now lie "ruinate", or provide a few squatting tenants with subsistence. In some of these areas, soil erosion has become serious in spite of current large scale attempts to conserve and reclaim the land.

The Yallahe Valley land area, which is on the southeast part of the upper slopes of the Blue Mountains, is being reforested or sown with special grass, while new crops and better agricultural practices are being introduced at lower altitudes. In this way, an area covering some 70 square miles is being brought back into production. A somewhat larger area around Christiana is being reclaimed in a similar manner.

Population

The ancestral composition of the population (1,624,000 on the April, 1960 census) on a percentage basis is made up of 76.3 Africans, 0.6 Chinese, 0.1 Lebanese, 1.7 East Indians, 0.8 Europeans, 1.7 Afro-East Indians, 0.6 Afro-Chinese. The estimated population on December 30, 1967 was 1,893,000. The birth rate for 1967 was 35.9 per 1,000 of the population and the death rate for 1967 was 7.1 per 1,000 of population.

English is the national language of the island, but a dialect based on English is spoken by the majority of the population.

Urban Areas

Kingston with a population of 376,520 at the 1960 census is the largest city and the capital of Jamaica.

Other important cities are Montego Bay, the leading tourist resort with a population of 23,610; Spanish Town, the former capitol, with a population of 14,206; and Mandeville in the heart of the bauxite mining area, with a population of 8,416.

Communication

There are 8,000 miles of roadway and all but the smallest mountain communities are accessible by motor transport. A railway links Kingston with Montego Bay and Port Antonio. There are numerous transport companies for goods and passengers. There are bus and metered taxi services in the capitol city and a few major towns.

Kingston and Montego Bay have international airports and the world's major airlines operate services to and from Jamaica. There are a few inland and coastal landing strips and a growing internal air-taxi service. Kingston harbor is one of the world's largest and safest natural harbors.

All the major towns are connected by telephone and a large number of villages are served by telegraphic services. International telecommunication services link Jamaica with the rest of the world.

The Economy

The Jamaican economy is basically agricultural with agriculture employing over 40 percent of the island's labor force. Before the second World War, agriculture produced 35 percent of the island's total

output (Gross Domestic Product at factor cost) with the main crops and their products -- bananas, sugar, and rum -- providing 4/5 of the island's export earnings. In 1967, agriculture provided only 11.4 percent of the island's total output and approximately 38 percent of export earnings.[4]

Jamaica's agricultural exports consist mainly of two commodities, bananas and sugar. But a variety of minor crops -- coffee, cocoa, pimento, ginger and citrus -- are exported. The island is well suited for the production of root crops, vegetables and a wide variety of fruits and livestock. These commodities are grown for local consumption. One of the striking characteristics of Jamaica's agriculture is the number of small farms. Of a total of 159,000 farms, 113,200 are less than five acres.[5]

The government provides the farmers with technical information, finance, and guaranteed markets through the Agricultural Development Corporation, agricultural development programs, and a marketing corporation, so as to improve production both for home consumption and for export.

The discovery of the large deposits of bauxite in Jamaica during the early 1950's led to the establishment of the mining industry and gave a surge to the economy. Bauxite mining industry contributed $80.5 million or 8.6 percent to the island's total output in 1967 and exports of bauxite and aluminum accounted for 49.0 percent of the island's earnings in visible exports.

---

[4] Economic Survey of Jamaica, Central Planning Unit, Kingston, 1967.

[5] Figures taken from Agricultural Census, 1961-69, Department of Statistics, Kingston, Jamaica.

The Government industrial development program, (which includes incentive legislation as well as promotional activities in the United States, Canada, and the United Kingdom) was implemented by the Jamaican Industrial Development Corporation and has transformed manufacturing in Jamaica. From processing only a few local agricultural products in the 1950's -- sugar, rum, condensed milk, oil and fats, cigars and cigarettes -- the island is now producing a wide range of manufactured items from both local and imported raw materials.

Some of the manufactured products are for export only. Among the manufactured goods are clothing, footwear, textiles, paints, building materials, including cement, agricultural machinery and toilet articles. There is also a steel mill, a rubber factory, and an oil refinery in operation.

Since World War II, Jamaica has become increasingly popular as a tourist resort and it is estimated that in 1967 the tourist industry earned $80.30 million for Jamaica. The number of tourists who visited in 1967 was 303,481, an increase of 8,534 or 2.9 percent over 1966.

Capital investment in Jamaica has been running at high levels. In 1967, it was about $247.2 million and a large portion of this amount came from overseas to finance bauxite mining, the manufacturing industry and hotels.

Economic growth in Jamaica was phenomenal in the period 1950-60. A visiting economist in 1961 ranked Jamaica's rate of growth with the three fastest growing countries of the world. An examination of the sectoral growth pattern indicates, however, that the growth rate was due to somewhat special circumstances and that it would be surprising if such a growth rate continued into the future.

The high rate of growth of the past decade was strongly associated with rapid growth of one industry, the mining of bauxite and alumina, which grew from nothing in 1950 to an 8.6 percent share of the gross domestic product by 1967.

In contrast, agricultural sectors showed a relatively slow rate of growth in both constant and current prices. The share of agricultural industries in the total product fell from 27 percent in 1952 to 11.4 percent in 1967. However, there are grounds for believing that the estimates for agriculture may have been too high in the early period, so the decline in importance of this industry may not have been as rapid as the figures indicate.

Within the agricultural sector, sugar and livestock showed the biggest absolute growth, but their relative importance in the economy as a whole has still declined.

National income rose by 6.2 percent to $785.12 million in 1966 as against $739.48 million in 1965. Per capita income amounted to $427.28 representing an increase of 3.3 percent over the 1965 figure of $413.56; the increase in 1965 over 1964 was $21.0 or 5.4 percent.[6]

Personal consumption rose by 6.6 percent from $656.32 million in 1965 to $699.44 in 1966, while Government consumption increased by 9.0 percent, from $96.88 million to $105.50 million.

One of the outstanding features of Jamaica's economic development has been the growth of the banking system and other financial institutions. Both government and private enterprise have taken part in this modernization. Activity in the banking and finance sector was at a

---

[6]Taken from the Economic Survey of Jamaica, Central Planning Unit, Kingston, 1966, page 2.

high level in 1966, although the rate of growth was somewhat less than in 1965. Total deposits in commercial banks grew at a faster rate than loans and advances. Interest rates remained steady during the first half of the year, then rose in the second half of the year following an increase in the Jamaica Bank rate in July.

The need for medium and long-term risk capital in certain sectors of the economy now is served by the Development Finance Corporation. A Small Business Loan Board gives financial assistance to small businesses.

The Bank of Jamaica, a central bank established in 1960, administers the island's currency and exercises its influence on the volume and conditions of the supply of credit and the core of the Government's external balances or reserves. The Bank is also banker to the Government and to the Commercial Banks.

In recent years, a number of discount and finance houses have been established. Large insurance companies are engaged in real estate mortgage lending and special mortgage companies have set up large scale financing of housing projects.

Commercial bank operations have expanded rapidly not only in the capital, but throughout the island. Six foreign commercial banks now operate in Jamaica, three Canadian, one American, one British and one Anglo-Canadian. There is also a Government Savings Bank. The finance sector of the economy (banking, insurance and real estate) contributed 9.8 percent to the island's total output in 1967.

The contribution of the finance sector to gross domestic product at factor cost (current prices) amounted to $45 million in 1967, compared with $40.88 million in 1966 and $36.6 million in 1965. This

represents an increase of 9.8 percent in 1967 and an increase of 11.6 percent in 1966.

Jamaica's quota in the International Monetary Fund was increased from $20 to $30 million (U.S. dollars), effective March 25, 1966. Under the terms of the agreement with the Government of Jamaica, one-quarter of the increase was paid by the Bank of Jamaica in gold (the equivalent of U.S. $2.5 million) and the balance in Jamaica pounds.

Jamaica's subscription to the International Bank for Reconstruction and Development was increased by $5.3 million U.S. to $32 million.

The Government actively encourages the development of various sectors of the economy through statutory boards such as the Jamaica Tourist Board which has offices in the United States, the Industrial Development Corporation, and the Agricultural Development Corporation, the Development Finance Corporation and the Scientific Research Council.

The Government Central Planning Unit is responsible for the overall development planning of the economy and the preparation of long-term plans.

The Objective

The main objective of this study is to investigate the role that agriculture has played in the economic development of Jamaica. Specifically, the aim is to analyze and to determine to what extent agriculture provided a food and fiber base, a market for non-farm goods and services, a source of capital, and workers for the economic development of Jamaica.

CHAPTER II

THE AGRICULTURAL SITUATION

In spite of the increasing progress made by the non-agricultural sector in recent years, agriculture is still the basic industry of Jamaica. About 700,000 Jamaicans, 40 percent of the population, are dependent on agriculture to a greater or lesser degree for their incomes. Of the total of $221 million of exports in 1966, around $84 million or about 38 percent were agricultural. However, in order to understand the possibilities for agricultural development, it is necessary to examine the existing agricultural situation and set forth the facts and features which are relevant to planning a program.

Trade statistics indicate that the principal agricultural exports consist of sugar, bananas, coffee, cocoa, pimentos, and ginger, which are sold to the various currency areas approximately as follows: (1) $56 million to the Sterling area, (2) $25.2 million to the Dollar area, and (3) $1.4 million elsewhere.[1]

Even though agricultural exports are big earners of foreign currency (value, $84 million in 1966) the importations of agricultural products are also big users of foreign currency (value, $59 million in 1966). This, together with the dependence on the United Kingdom as a market for

---

[1]Most of the data presented in this section are based on a paper presented to the Faculty of Agriculture at St. Augustine Campus of the U.W.I., in Trinidad, March 7, 1968, by G. P. Chapman, Research Coordinator in Jamaica for the Faculty of Agriculture of the University.

exports, create unusual agricultural problems. Following are examples of some of these problems.

1. Recent devaluation of the United Kingdom currency was followed almost automatically by devaluation of the Jamaican currency.
2. Through imports, Jamaica has developed a taste and demand for such things as wheat flour, green garden peas, and codfish.
3. The island imports foodstuffs having maize as a major ingredient which could be grown locally.
4. Foreign ownership of large farms that produce mainly for export, particularly sugar, are less responsive to local needs.
5. Until recently, local foodstuffs were fringe products of agriculture and consequently, patterns of diet are unsatisfactory even now. Various reports have indicated for city families that calories and protein intakes of young people are appreciably below recommended levels. For rural families, the values are still lower. To take two examples, children around 14 years of age in rural Jamaica may get only about 50 percent of the recommended calorie intake and about 42 percent of the recommended protein.

Many of these things are true of other Caribbean islands, but Jamaica has made several moves which may alleviate some of the problems.

1. The livestock industry is undergoing considerable reappraisal and change. Animal food, in response to the effects of devaluation, is heavily subsidized and it is considered

feasible to raise substantially the yields of eggs, poultry, beef, pork and milk.

2. The Agricultural Marketing Corporation has begun to stimulate the output of vegetables. Since 1962, the island has ceased importing tomatoes and carrots and even exports tomatoes occasionally. A similar situation is developing in Irish potatoes where (apart from seed material) imports have ceased and some are exported to such markets as Trinidad.
3. The problem of periodic surplus is partially met by canning plants employing about 1,500 people. The Agricultural Marketing Corporation is currently erecting a large refrigerated warehouse.
4. A promising new export has been yams to the West Indian communities in England and the United States.
5. The export of flowers has begun in a small way and could increase.
6. The Government seems to have recognized that it should encourage industries which process locally grown raw materials and some products which yield essential oils are processed by extraction techniques rather than exported in unmodified form.

There is a sense of change in Jamaican agriculture and this rests on several factors. The main factor, however, is that the island has become aware of its big northern neighbors with their virtually inexhaustible markets and gleaming, assuring technology.

In 1965, the Botany Department of the University of the West Indies at Mona, Jamaica, was host to the American Society of Horticultural Science. During their stay, the delegation made a complete and exhaustive study of the agricultural sector and most of the recommendations they made have not yet been implemented.

The Major Problems

The chief impediments to agricultural development are: excessive farm population and labor, the somewhat inefficient, traditional methods of production, and the lack of capital in the form of fertilizer.

As mentioned earlier, only about one-half of Jamaican land area is more or less suited to agriculture. If the emphasis is on tillage, this proportion must be reduced, but for grazing it could be increased. There are some 400 people per square mile. Cultivated land occurs between sea level and 5,000 feet and across this range rainfall varies from 30 inches to over 200 inches per year.

The topography is very uneven for the most part and there is a wide range of soil types. To the physical problems presented by this formidable terrain are added those resulting from a skewed distribution of farm sizes. Three percent of farms occupy 66 percent of the land space while 97 percent of farms occupy 33 percent of the area.

Biologically, the Jamaican environment is one of considerable diversity, but for large areas the unavailability of water is a critically limiting factor. To this the United Nations Grand Water Survey is a partial answer, but although concerned with three areas, most of its work is confined to one only -- the Pedro Plains.

Marketing arrangements need modifying in two important respects, namely (1) improved organization of the domestic and the overseas markets; and (2) diversification of markets abroad to lessen dependence on the United Kingdom.

Of comparable importance is the need to diversify crops so as to reduce dependence on sugar, bananas, and citrus, to improve nutritional levels and to match the population increase.

Agricultural improvement has both a sociological and a technical aspect and neither can be ignored. Sir Arthur Lewis states:[2]

> It is of greatest importance everywhere that farmers should hold their land on terms which give them security and incentive, and it is also of the greatest importance to have adequate institutions for making capital available. These questions apart, far too much emphasis is placed in current discussion on other institutional matters -- especially fragmentation, size and marketing -- and much too little on other means of improving efficiency -- especially water supplies, seed farms for improved seeds, fertilizer and agricultural extension services. One gets the impression from much of the discussion that much can be done to increase agricultural productivity without vast institutional changes in the countryside. This is not so.

Prospects for Improved Yields

In Jamaican agriculture the impression sometimes fostered is that Jamaican soil is somehow infertile, its climate difficult and uncogenial. It is true that many of the farmers live and work under difficult or harsh conditions. It would be unfair to underestimate in any way the hardships they have. Even so, it will be useful to supply some contrary examples.

---

[2] Lewis, W. Arthur, The Theory of Economic Growth, George Allen and Unwin Ltd., London, 1957, p. 136.

1. The Frank Fine Company of Florida recently began growing cucumbers in Clarendon (one of the 14 parishes of Jamaica). The company did not have unlimited choice of land. Within a year it has reached the position where it flies 40 tons of cucumbers to Florida per day. The profit to the company in America's terms is "adequate".
2. Local corn yields range from 7 to 15 bushels per acre. The pioneer company at Caymanas Estate (one of our large sugar estates) has, in about five years developed F 1 hybrids giving more than 60 bushels per acre and with the prospect of substantial further gain.
3. Sugar yields of 45 tons per acre (comparable with Hawaii) are technically possible although apparently not economic.
4. It has been estimated that yields of soybeans (an Indonesian selection at Twickenham Park estate) can reach 54 bushels per acre.
5. The average yield per 305-day lactation for Jamaica Hope (one of the major breeds of cattle) at Bodles is 766 gallons and the milk has high butterfat content.
6. Experience with tomatoes suggests that high yields are possible.[3] Individual plants have given up to 7 lbs. of marketable fruits per 100 day generation cycle.

If one adds to these facts, the advantages of quarantine that are feasible for an island and the possibilities offered by twentieth century science, much Jamaican farm land can rightly be regarded as potentially fertile.

---

[3]G. P. Chapman, Faculty of Agriculture, U.W., Mona, Jamaica.

The Nature of Jamaican Agriculture

Agricultural techniques in many parts of the island can be greatly improved. Very little fertilizer is used outside the sugar estates. Wasteful agricultural practices are common. Soil erosion has been allowed to take a frightful toll. The yield of pastures is extremely poor even though natural conditions in many areas are favorable to good pastures.

Land under cultivation can be expanded considerably through irrigation, land reclamation, and proper soil conservation practices.[4] These conclusions rest upon extensive operation throughout the island. They are also confirmed by such figures as are available. In 1960, for example, it is estimated that approximately one million acres or 36 percent of the area of Jamaica were devoted to agricultural use. Of this total, more than 434,000 acres apparently were under cultivation. The irrigated area did not exceed 41,400 acres.

Of the 595,000 acres in permanent meadow and pasture only 10% could be characterized as "improved". Part of this land can be cultivated, but some 1.19 million acres were "unused" or considered "waste land". Unquestionably, the greater part of this area of unused or waste land could not be devoted to agriculture because it is either too steep or infertile. However, part of the unused land, an estimated 312,000 acres, has been under intermittent cultivation in the past and could be converted to permanent agricultural use if soil conservation measures were applied. Some of the "permanent" waste land has good soil and could be made productive by irrigation and reclamation of marshes.

---

[4] See map on page 25.

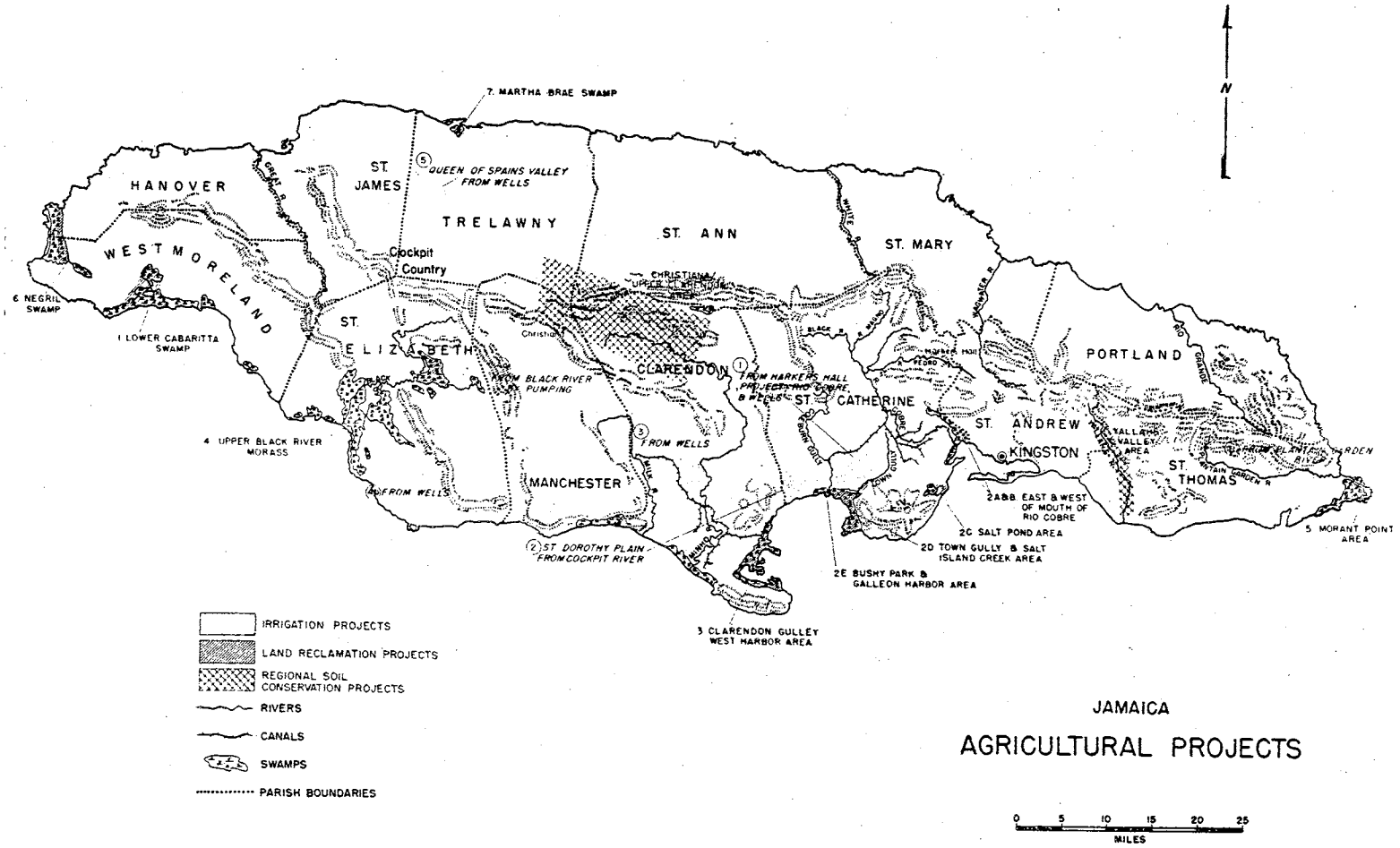

Figure 3. Illustrating Present and Possible Agricultural Projects

Five hundred thousand acres were in "woods and forests". A considerable part of this represents scrub forest.

There is little doubt, therefore, that a development program could assist in satisfying the "land hunger" which is said to characterize Jamaica.

Deforestation has had serious effects on Agriculture. Reckless denuding of hillsides has greatly accelerated soil erosion and added to the number and gravity of destructive flash floods. There are continuous inroads on the 500,000 acres of forests, much of which are poor and there are frequent demands that part of the 250,000 acres of Crown Lands in forest reserves be turned to cultivation.

A reforestation scheme has been in operation over the last ten years, but on a scale insufficient even to keep pace with deforestation. At present, Jamaica supplies only a fourth of its timber requirements.

Hillside agriculture is, and will remain, a necessity in Jamaica. Only 20 percent of the island is flat or slightly rolling. The remainder is hilly and mountainous. In view of the population pressure, it is not feasible to concentrate simply on the development of level or nearly level land. While part of the land in crops is too steep for cultivation, there can and should be a net extension of hilly land under cultivation if erosion can be controlled.

At present, hillsides are tilled primarily by small farmers under conditions which accelerate soil erosion. One of the principal problems is to make their agricultural practices consistent with soil conservation.

Although Jamaica is known mainly for its export crops, the latter probably accounts for less than one-third the value of total agriculture

production. The output of root crops (yams, sweet potatoes, cassava), maize, pulses, rice, coconuts, and milk and meat, all of which are produced for the home markets, far exceed that of sugar cane,[5] bananas, citrus and export crops of lesser importance such as ginger, pimento, coffee, and cocoa.

Yet, the importance of food crops for local consumption has not been fully recognized until recently and their proper cultivation has not received adequate attention. Yields of food crops and livestock products are generally far below the levels that could be achieved with proper agricultural practices. Both the growth of population which is anticipated for the next decade and the need for a better balanced diet demand a substantial increase in food production.

The wide variation in rainfall, soil types, altitudes and temperatures makes possible an unusually diversified agriculture. Tropical, sub-tropical, and even temperate zone crops can be grown in various parts of the island. At different altitudes, excellent coffee and cocoa can be produced. Sugar and bananas flourish in the plains and valleys and also on hillsides. Dry-area crops such as guavas, limes, cashews and certain fibers can be grown as well as those demanding more rainfall.

There exists extremely small and very large land holdings and very efficient and inefficient agriculture side by side. Figures taken from the 1954 census show that 70 percent of the number of farms were less than 5 acres in size. They accounted for approximately 14 percent of

---

[5] In this Chapter and for the Thesis on a whole, the use of the word sugar cane means in essence sugar cane by-products, which are sugar, rum, and molasses.

the total acreage in farms and approximately 28 percent of the land area under cultivation. Farms between 100 and 500 acres constituted only approximately 1 percent of the total but represented 12 percent of the total acreage, 6 of the area under cultivation. Farms of 500 acres and over accounted for 25 percent of the total acreage, 37.7 percent of the area under cultivation. The Agricultural Census of 1961 disclosed that there was a substantial decrease in both the size and acreage of cultivated land on very small farms, that is, farms under 5 acres, while on the other hand, farms of 500 acres and over increased. In general, large farms, those over 100 acres, have increased their acreage of cultivated land, while those under 100 acres have shown a decrease. The total number of farms had decreased by 22 percent.[6]

Landed properties in Jamaica are basically of two types, estates in the alluvial plains and valleys producing primarily sugar cane, bananas, coconuts and some livestock and the livestock ranches, or "pens" in the uplands. The first of these are generally very efficient. The large sugar estates, for instance, have established a reputation for progressive management. Their yields are at least 60-75 percent higher than those of the small farmers who deliver their cane to sugar estates for milling.[7] On the other hand, the large livestock properties are for the most part characterized by low yields. In general, the small farmers are the most inefficient, partly because they have the least desirable land, and partly because their agricultural techniques

---

[6]Agricultural Census 1961-62. Changes in Numbers and Size Distribution of Farms.

[7]See Daily Gleaner, March 4, 1966, Kingston, Jamaica.

are the most backward. The small farmers predominate in the hills and produce nearly all the food for local consumption. An increase in the output of these small farmers is a matter of paramount concern.

Certain features of land holding and of the attitude toward land are serious obstacles to agricultural development. In many cases, farmers do not have a properly perfected title to their land and thus cannot put up their land as security for a loan. Through fragmentation by inheritance, land is frequently the object of many and confusing claims which have never been properly adjusted. Land is the most coveted possession. Ever since the days of slavery, it has been regarded as a guarantee of individual freedom and as a form of insurance against want. The small farmer considers untrammeled, absolute ownership as essential and tends to resist any attempt to restrict his right to use the land as he pleases. However, much of such restriction may be in the public interest. Unfortunately, absolute ownership in Jamaica has often meant in practice the right of the owner to run his land in his own way. The concept of land as a national economic asset has not yet been widely accepted.

In some aspects, the reckless use of land is a result of the tenancy system in Jamaica. According to the 1961 census, 98,509 acres of farm land were rented. Rented land represented only a little over 5 percent of the total, but since land is rented primarily for cultivation, its proportion of total land under cultivation -- almost 19 percent -- is more significant. Also, since most land is leased only for one year, there is little or no incentive for the farmer to conserve or improve the land.

The prospects for improvement in agriculture lie in the fact that there are large numbers of official and unofficial organizations looking after the interests of the farmers. Among the official organizations are the Department of Agriculture which is charged with agricultural research and experimentation, farm extension and improvement work and operation of the School of Agriculture; the Department of Commerce and Industries which collects, stores, processes and exports a number of agricultural products; the Lands Department which has been charged with settling small farmers on land acquired from large land owners; the Department of Public Works which is responsible for irrigation and drainage works; the Department of Forestry which also looks after fisheries; the Registrar of Cooperative Societies which registers and supervises cooperatives; and the Loan Societies Board which provides funds for agricultural credit to the so-called People's Cooperative Banks.

The most respected organization, and the oldest, is the Jamaica Agricultural Society which has always received inadequate government attention. With its 525 branches throughout the island, it is generally representative of all branches of agriculture although it has tended more recently to look after the interests of small farmers in particular. It has fostered many commodity associations and has been instrumental in organizing the young farmers' 4-H Club movement.

Not long ago a Farmer's Federation was established for the primary purpose of championing the producers' interests before the government. It is comprised of newly organized parish farmers' federations and particularly the long-established and powerful commodity associations such as the Sugar Manufacturers Association, the All-Island Banana Growers Association, the Citrus Growers Association and the Cane Farmers Association.

The existence of these numerous associations is a source of both strength and weakness. On the one hand, they provide many points of contact with the farming community, give the farmers opportunity for self-help and create the framework for close cooperation between the government and farmers. On the other hand, they undoubtedly accentuate the difficulties of farming and carrying out a coordinated agricultural policy. Unfortunately, the government departments themselves are often poorly coordinated, and the farmers' organizations frequently work at cross-purposes and engage in internecine strife. The projected organization of the Ministry of Agriculture which will embrace most of the government departments dealing with agriculture is expected to improve coordination within the government, but there is unfortunately, little sign as yet that the private agricultural organization will unite on a common objective and a common program.

The Role of the University in Agricultural Development[8]

The Faculty of Agriculture of the University of the West Indies is in Trinidad. Its main functions are teaching, research, and extension for all the West Indian Islands. However, in an attempt to supplement the work of the University in Trinidad, the recent establishment of research activities in Jamaica itself is to deal with both the long-term and short-term problems which Jamaican agriculture encounters.

---

[8]Materials presented in this section are based on the article "Farming -- Fillup to Come from Mona", by the Daily Gleaner, November 22, 1967.

Need for Increased Production

Jamaica is currently trying to find a variety of red peas which will yield as well if not better than any coming out of the United States or Peru, but which at the same time is not affected by the island's irregular incidence of rainfall. In short, a variety is needed which will not start sprouting in the pod immediately after the slightest shower at bearing-time.

The University in its extension from St. Augustine (Trinidad) to Mona (Jamaica) will, as in the past, continue to direct time and thought to the development of the local Miss Kelly variety of red peas. It is also looking deeply into the characteristics of other local varieties, examining management practices, as well as looking into the environment for growing this pulse.

The University will also study the reaping, storing, and other techniques and, out of this research, build up a discipline to make local red peas cultivation far more fruitful and profitable to the country than it is now.

Red peas, of course, is not the only crop to which Jamaica wants particular attention paid. It is a random example. A call has been sounded across Jamaica for increased domestic production of foodstuffs in general to eliminate the need for $58.8 million of imports annually.

As domestic production grows and the circulation of money widens and quickens proportionately, the demand for foreign goods, aside from food, is expected to call for foreign currency payments greater than are now being made on account of foodstuffs. This currency must be found. The additional exchange must come from agriculture more than anywhere else, since agriculture is the country's main resource.

The University, therefore, in its new thrust into Jamaican agriculture, is not considering crops only in the context of imports replacement, but of developing export probability, too; and there are crops already being exported which, if they could be produced more advantageously than at present, would be worth far more to the island's revenues and to the national economy.

Co-ordination

A 13-point linkage of research work at the Faculty of Agriculture of the University of the West Indies and the Ministry of Agriculture in Jamaica was announced at the time of the setting up of the Faculty of Agriculture at Mona (Jamaica).

One of the assignments in the 13-point arrangement provides, for instance, for a plant breeder to work especially on red peas and other legumes. Another assigns a plant pathologist to investigate disease incidence and disease resistence in the island's major food crops. A third significant assignment is that of an agricultural economist to study the growth prospects of the local dairy industry and to identify any growth-limiting factors that might exist. A fourth is that of a herbicides agronomist who has already made a meaningful contribution to agricultural practices in Jamaica over the past two years.

Thus, this establishment of St. Augustine activity on the Mona campus can be regarded as the planting of the seed. Germination is to follow, and then growth. As for the way in which the establishment will work, or has already begun to work, it is being described as multi-disciplinary. The plant breeder who is to work on red peas and the grain legumes, as an example, will work on the production of new

varieties or the improvement of existing ones. Although this will be his specialty, he will consult with the plant pathologist on the disease contracting characteristics of the materials with which he deals. He will certainly have to consult with the agricultural economist in coming to conclusions about production costs. The soil surveyor and the specialist in herbicides will have their parts to play too.

Therefore, as of now, the University of the West Indies is playing a leading role in Jamaica's agriculture. Farm research has come to Jamaica; farm research which will certainly be a stimulus to Jamaican agriculture.

CHAPTER III

THE AGRICULTURAL LABOR PROBLEM

Introduction

The literature on underdeveloped and developing countries contains frequent assertions that such countries have much disguised or hidden unemployment. The term disguised unemployment, as explained by Professor Nurkse, is not applied to wage labor but denotes a condition of family employment in peasant communities where people working on farms or small peasant plots contribute virtually nothing to output, but subsist on a share of their families' real incomes.[1]

Some studies attempt to measure the extent of surplus labor in agriculture while others attempt to measure the amount of capital needed to absorb the surplus labor in non-agricultural sectors. The clear implication of these studies is that marginal productivity of agricultural labor in some underdeveloped countries is zero or may even be negative, thus implying that removing some labor would not decrease farm output and might even increase it.

The basic problem faced by a dualistic economy like Jamaica with its unfavorable agricultural factor endowment and increasing population pressure is to reallocate as much labor as possible from the agricultural

---

[1] See R. Nurkse, Problem of Capital Formation in Underdeveloped Countries, (Oxford, 1952), p. 33.

sector to the industrial sector. It is rather hopeless to try to introduce better farming methods until the excess population is removed. If the farm population is to be reduced, the process of shifting labor from farm to non-farm must be sufficiently rapid to offset the growth of the farm population which results from the high birth rate. The nature of Jamaica's labor problem is illustrated by the use of three examples in the following section.

A Three-Case Example

These examples are useful for illustrating where Jamaica's labor problem lies. The first example is one in which the entire economy is assumed to be made up of small farmers[2] each owning his land. Obviously, the return to each small farmer is some combination of rent and wages. If we should attribute the total return to rent, then labor's share would be zero and, therefore, the wage is zero. No small farmer can hire any labor since he cannot pay him a wage. However, there still remains on the farms family labor who, although working, earn nothing. Thus, a situation of disguised as well as obvious unemployment and surplus labor would exist.

For the second example, assume that the agricultural community is made up of landlords who do not work the land, but that there are tenants and sharecroppers who do. In this case, the rent goes to the landlord and the sharecropper gets only the return for his labor. This return depends on the competitively determined share of the crop.

---

[2]According to the Agricultural Census, 1961-62, a small farm in Jamaica is one between 0 and 5 acres.

Assume that each sharecropper has a small plot for which the rent is, say 50 percent, and it takes only half his time to work his plot. The rest of his labor time would then be a free good to him. It would then be in the interest of each sharecropper to seek an additional piece of land even if he has to pay a higher rent for it. The competition for additional land must reduce the tenant's share.

The question now is how far can such a reduction go? No matter how small the share becomes, there is always an incentive for an individual sharecropper to get more land at an even smaller share since his excess labor time is essentially a free good. However, the tenant's share would not be expected to fall to zero because landlords would not expect the tenant to give his services free. But as tenants compete for land on shares, those who cannot subsist as shares fall toward zero are forced out of agriuclture.

For the third example, assume the agricultural labor force is made up of landless laborers rather than tenants. In this example, any unemployment is visible rather than disguised. If we assume perfect markets, competition will force wages down towards zero. That is to say, if there is a labor surplus, then some members of the work force must be unemployed, and the unemployed will be willing to work for less than the going wage. This will again tend to depress wages to such an extent that labor must leave agriculture.

The Jamaican agricultural sector is composed primarily of small farmers who own their land, but is a mixture of all three of the above cases. Figures taken from Jamaica's Agricultural Census 1961-62 show

that there were approximately 159,000 farms.[3] Approximately 121,000 or 76 percent of these farms were completely or partially owned by the operators. Approximately 85,000 of the 159,000 farms were classified as small farms (between 0-5 acres).

The analysis of Case I suggests that the return to each owner is a combination of rent and wages. But if we were to attribute all this return to rent we would have to agree that the marginal productivity is zero and thus, the imputed wage is zero. This would also imply that each farmer will require less labor than he has available and no small farmer can hire any labor since he cannot pay them. This is essentially the case in the farming sector of Jamaica and this shall be subject to further elaboration.

Consider the other two cases. Case II assumes an agricultural community that is made up of landlords who do not work the land, but rent it. This case does not seem to apply to Jamaica as over three-quarters of the land is owned by those who work it.[4] There are a few absentee owners of large farms but these farms are among the most productive farms and employ a large portion of the hired agricultural labor force.

Case III can likewise be dismissed for similar reasons even though a large landless labor force does exist. This landless labor force constitutes the "root" of our agricultural labor problem.

---

[3] A farm often consists of more than one parcel not all occupied under the same kind of tenure.

[4] See Table I.

TABLE I

PERCENT DISTRIBUTION OF FARMS BY BASIS OCCUPANCY AND SIZE GROUPS -- 1961 (158,941 Farms)

Size Groups	Total	Owned	Squatted	Rented	Free	Owned and Rented	Owned and Free	Rented and Free	Owned, Rented and Free	Other
0 and < 5 acres	100.0	74.9	0.8	7.5	2.5	10.6	2.5	0.7	0.4	0.1
5 and < 25 acres	100.0	78.0	0.2	1.3	1.1	14.3	3.6	0.4	0.1	0.2
25 and < 100 acres	100.0	84.5	--	1.6	0.8	9.6	2.8	--	0.5	0.2
100 and < 500 acres	100.0	88.3	--	2.8	0.8	6.4	1.6	0.1	0.1	--
Over 500 acres	100.0	91.7	--	2.3	0.3	5.1	0.3	--	0.3	--
ALL FARMS	100.0	76.0	0.6	5.8	2.1	11.4	2.8	0.6	0.5	0.1

Source: Agricultural Census 1961-1962, Department of Statistics, Kingston, Jamaica.

An Army of Surplus Workers

Precise estimates of the number of unemployed are not available, but conservative estimates range from 16 to 25 percent. While this is a rather wide range, any figure within this range should be considered serious unemployment, especially when one considers that the economy is not generating sufficient jobs to absorb the tens of thousands of youngsters who join the labor force each year. The population at the end of 1967 was estimated at 1,893,100 persons, representing an increase of 34,000 or 1.9 over the 1966 figure of 1,859,000. The increase in 1966 over 1965 was 48,000 or 2.6 percent as shown in Tables II and III.

The improvement in production techniques, the mechanization of some sections of agriculture, the steady growth of capital in agriculture, the competitiveness of small-scale production on one hand and on the other the higher fertility of the rural population, results in a redundancy of population in some parts of Jamaica. To illustrate, between 1954 and 1961 the number of farms in Jamaica decreased by 31 thousand. Of this number, the farms with acreage under 5 acres fell by nearly 20,000 (see Table IV). At the same time the number of farms with 500 or more acres and over increased by 19 and their acreage by 57,000.

During this period, the number of agricultural workers decreased by nearly 100,000 from 262,000 to 165,000 or 37 percent. (This does not include farm operators). On farms with less than 5 acres, the decrease in workers was 52,000 compared with 6,500 for farms with acreage of 500 and over. The percentage decline, however, varies according to size of farm. Farms with less than 5 acres showed the greatest decline, about 49 percent, while those over 500 acres showed a decline of about 14 percent.

TABLE II

VITAL STATISTICS: 1957 - 1967

Year	Births	Deaths	Natural Increase	Net Emigration	Net Increase	Infant Deaths	Still Birth
1957	40,445	14,130	46,315	11,425	34,890	3,304	867
1958	63,517	16,550	46,967	6,526	40,441	3,945	850
1959	63,824	14,321	49,503	16,739	32,764	4,458	828
1960	68,413	14,193	54,220	28,255	22,965	3,522	781
1961	66,128	14,167	51,961	38,699	13,262	3,227	819
1962	64,913	15,159	49,754	28,700	23,400	3,168	743
1963	66,800	15,300	51,500	7,300	44,200	3,300	830
1964	68,359	13.500	55,800	13,500	42,300	2,700	890
1965	69,800	14,000	55,800	6,500	49,300	2,600	830
1966	71,400	14,300	57,100	8,900	48,200	2,500	770
1967	67,400	13.300	54,100	20,000	34,100	2,100	736

Source: Annual Abstract of Statistics, 1967, Department of Statistics, Kingston, Jamaica.

TABLE III

DEMOGRAPHIC STATISTICS: 1963 - 1967

Year	Population at 31st December	Birth Rate (Per 1000)	Death Rate (Per 1000)	Rate of Natural Increase (Per 1000)	Infant Mortality Rate (Per 1000 Live Birth)
1963	1,720,000	39.3	8.0	30.3	49.2
1964	1,762,000	39.8	7.7	32.1	39.3
1965	1,811,000	39.0	7.9	31.1	37.4
1966	1,859,100	38.9	7.8	31.1	35.4
1967	1,893,100	35.9	7.1	39.1	30.5

Source: Economic Survey of Jamaica, 1967, Central Planning Unit, Kingston, Jamaica.

TABLE IV

FARMS BY SIZE GROUP AND FARM WORKERS

Size of Farms	Number of Farms		Total Acreage of Land in Farms		Number of Agricultural Workers (incl. unpaid) Family Worker		Percentage Decrease	Average Acreage Per Farm		Average Number of Workers Per Farm*	
(Acres)	1954	1961	1954	1961	1954	1961	%	1954	1961	1954	1961
Under 5	139,043	113,239	249,074	I98,000	105,700	53,457	49.4	1.8	1.8	0.8	0.5
5 to 24	45,024	40,769	426,976	389,441	75,639	46,970	37.9	9.5	9.6	1.4	1.2
25 to 99	4,620	3,803	192,411	167,607	21,295	13,999	35.8	41.4	42.1	3.9	3.7
100 to 499	881	779	204,131	185,596	11,132	8,617	22.6	231.7	232.8	12.6	11.3
500 and over	332	351	716,068	770,786	48,334	41,807	13.5	2156.8	2204.4	146.0	120.0
ALL FARMS	189,906	158,941	1,788,660	1,711,430	262,660	164,850	37.2	9.4	10.7	1.4	1.0

Source: Department of Statistics, Kingston, Jamaica, 1967.

*Does not include the farm operator.

While in 1954 a farm with an acreage of 500 acres and over had an average of 146 employees, in 1961 the average was only 120 employees. The increasing economic activity of Jamaican women is another factor responsible for the surplus of labor. In 1960, 48.4 percent of the women 14 years of age and over were economically active in all aspects of the economy. This is one of the highest percentages in the world, and almost the highest in and around the American continent. It is another question whether as reported in the 1960 population census 14.5 percent of them were really unemployed.

The reason for the decline in numbers of agricultural workers, during the period under study and to the present, can be at least partly attributed to emigration. Emigration was very heavy between 1954-1961 (see Tables V and VI).

TABLE V

MIGRATION TO THE UNITED KINGDOM

Year	Total	Males	Females	Children*
1955	18,564	11,515	6,718	331
1956	17,302	9,144	7,577	581
1957	13,087	6,257	6,096	733
1958	9,993	4,425	4,509	1,059
1959	12,796	6,410	4.955	1,431
1960	32,060	18,372	11,258	2,430
1961	39,203	19,181	16,276	3,746
1962	22,841	8,368	10,115	4,358
1963	7,494	NA	NA	NA
1964	9,560	2,018	2,712	4,522

Source: Ministry of Labor, Kingston, Jamaica, 1967.

*Children are defined as persons under the age of 16 years.

TABLE VI

FARM LABORERS TO THE UNITED STATES OF AMERICA

Year	Recruited	Returned to Jamaica	Under Contract in the U.S.A.
1955	2,674	2,115	4,473
1956	3,378	2,279	5,521
1957	4,313	3,298	6,445
1958	3,722	4,785	5,350
1959	4,596	3,972	6,021
1960	5,898	4,992	6,929
1961	6,391	5,869	7,444
1962	9,721	6,888	10,207
1963	9,369	10,401	9,057
1964	11,542	8,409	12,058

Source: Ministry of Labor, Kingston, Jamaica, 1967.

Note: Discrepancies in total are due to workers who skip contract -- some of whom are later repatriated.

A large part of the adult migrants were farmers (whole or part time). In addition to the emigratory movement, there has been a continued migratory movement towards the towns from rural areas, and from agricultural towards industrial occupations in urban areas.

In many cases where the cultivator in charge of a farm left the island or gave up farming, his farm, particularly rented parcels, reverted to bush. In addition, some small homesteads, though still occupied by the same family ceased to qualify as farms because the head had acquired employment in industry.

A further comparison can be made with reference to agricultural labor and that is between the results of the 1960 Population Census and the Agricultural Census of 1961-62. The former records 230,000 persons

whose main activity is agriculture, 96,000 of whom are employees, 17,000 unpaid family workers and 117,000 employers and own account workers.

As the Agricultural Census figures of 1961-62 did not include farm operators, the 117,000 own account workers and employers must be subtracted before comparison. Also the Agricultural Census included all workers, many of whose main occupation was outside of agriculture. The numbers which had subsidiary occupation as cultivators and farm laborers, but whose main activity is other than in agriculture should be added to the Population Census figures for comparison. The total includes 96,000 (employees with main activity in agriculture) plus 17,000 (unpaid family workers) plus persons with subsidiary occupation in agriculture and main activity outside of agriculture. From Table VII it can be seen that approximately 43,000 persons derived their main source of income outside of agriculture and thus apparently can be considered as being outside of agriculture.

The Population Census figures used for comparison, therefore, become 96,000 + 17,000 + 43,000 = 156,000 agricultural laborers which agrees well with 165,000 agricultural laborers estimated independently from the Agricultural Census data.

The fact that the census of 1960 and 1961-62 were not taken at the same time and that several months had elapsed between the two exercises would also have contributed to any difference.

An analysis of the farm population situation in Table VIII shows there were 596,000 dependents residing on the farm, but this does not fully represent the total farm population since it excludes (a) the farm operators, and (b) persons resident in farm households, but not dependent on the farmer and who are not farmers.

TABLE VII

FARMERS CLASSIFIED BY MAIN SOURCE OF CASH INCOME AND SIZE GROUP, 1961

Size Groups	Total No. of Farms	Farmers Main Source of Cash Income			
		Own Account	Employment in Agriculture	Non Agriculture	Pension
0 and < 5 acres	113,239	59,493	18,421	32,689	2,636
5 and < 25 acres	40,769	32,220	2,233	5,794	522
25 and < 100 acres	3,803	8,998	137	599	69
100 and < 500 acres	779	538	27	200	14
Over 500 acres	351	286	8	56	1
ALL FARMS	158,941	95,531	20,830	39,338	3,242

Source: Agricultural Census, Department of Statistics, Kingston, Jamaica, 1967.

A maximum figure of the farm population may be estimated by adding to the 596,000 the 159,000 representing farmers this gives 755,000. However, not all farm operators reside on a farm, therefore, a reasonable estimate of the total population residing on farms and dependents in some measure on agriculture would appear to be 740,000. The corresponding estimate for 1954 was 900,000 so that a decline of about 160,000 persons is indicated.

How has the farm population change affected agricultural output? An analysis of the level of production of selected agricultural commodities between the periods 1954-1961, revealed that the levels of production have declined after 1954, and in some cases, the extent of the decrease

TABLE VIII

TOTAL NUMBER OF FARMER'S DEPENDENTS (RESIDENT) ON FARMS WITH VARYING NUMBERS OF DEPENDENTS, CLASSIFIED BY SIZE GROUPS, 1961

Size Groups	Total Number of Dependents On Farm With				Total No. of Deps.	Total No. of Farmers	No. of Deps. Per Farm
	1-2 Deps.	3-5 Deps	6-9 Deps.	10 and Over Deps.			
0 and < 5 acres	52,035	154,377	142,901	43,281	392,594	113,239	3.5
5 and < 25 acres	14,590	57,556	73,102	37,529	182,777	40,769	4.5
25 and < 100 acres	1,204	4,800	6,863	4,945	17,812	3,803	4.7
100 and < 500 acres	296	761	830	472	2,359	771	3.1
Over 500 acres	109	248	154	78	589	351	1.7
TOTAL	68,234	217,742	223,850	86,305	596,131	158,941	3.8

Source: Agricultural Census, 1961-62, Department of Statistics, Kingston, Jamaica.

was substantial (see Table IX). The major export crops, sugar and bananas, are among the few which held their own, but those which are used mainly for local consumption, for example starchy roots (yams, sweet potatoes, cassava, etc.), declined.

Declines in the levels of production are due to a combination of factors. Some of the more important are:

1. The decline in the number of farms which has taken place between 1954 and 1961 in nearly every size group;
2. Migration, mainly to the United Kingdom;
3. The continued migratory movements towards the towns from rural areas and from agriculture towards industrial occupation;
4. Changes in consumption patterns of the population as a whole.

It is reasonable to conclude that if the number of farms in a particular size group decreased by a certain percentage, then production for that size group would normally decrease by the same percentage,[5] if productivity remained the same for this size group, or if acreage devoted to crops on the remaining farms remained constant. However, in most cases, the percentage decline in production is much more than the extent of the decline in the number of farms for the size indicating that either productivity or the number of acres devoted to crops, or the number of trees of a particular type, etc., must also have decreased on the remaining farms.

---

[5]Farms under 5 acres are in line with the decline in the production of root crops which was noted earlier.

TABLE IX

PRODUCTION OF SELECTED CROPS

Crops	Year, 1954	Year, 1961	Change	
Sugar	3,928,000	4,341,592	+413,592	Tons
Banana	22,539,000	16,646,348	-5,892,652	Stems
Coconut	80,990,354	105,427,568	+24,437,214	Nuts
Yams	1,169,452	844,799	-324,653	Cwt.
Sweet Potatoes	239,132	173,165	-65,967	Cwt.
Cassava	231,087	183,989	-47,098	Cwt.
Corn	521,978	250,470	-271,508	Bushels
Peasant Beans	101,457	132,942	+31,485	Bushels
Ground Nuts	11,103	13,579	+2,476	Bushels
Breadfruit	2,273,700	4,027,900	+1,754,200	Dozens
Tobacco	N A	447,644	--	Lbs.
Sweet Oranges	751,681	1,351,273	+599,592	Boxes
Coffee	5,440,000	4,341,000	-1,099,000	Lbs.
Cocoa	4,100,000	5,700,000	+1,600,000	Lbs.
Grapefruit	494,465	820,933	+326,468	Boxes

Source: Compiled from the various production data, Agricultural Census, 1960-61, Department of Statistics, Kingston, Jamaica.

Table X reveals that the total acreage of farm land declined from roughly 1.8 to 1.7 million acres or the equivalent of 4.3 percent between 1954-61. There was also a reduction in the number of farms in the various size groups. There was a substantial decline in the acreage of cultivated land, since the total acreage of land in this category was estimated at 615,000 acres in 1954 and 545,000 acres in 1961. This corresponds to a decrease of 11 percent. However, not all size groups have shown a similar decrease. Indeed, large farms, those over 100 acres have increased their acreage of cultivated land.

These movements are consistent with the production trends. For instance, the substantial decrease in the acreage of cultivated land on very small farms, those under 5 acres, is in line with the decline in the production of root crops. On the other hand, the increase in the cultivated acreage on large farms is consistent with the greater contribution which very large farms are making to certain crops, e.g., sugar cane and citrus.

Changes in consumption patterns are more important than it appears af first sight. A decrease in production must be due not only to a decline in the number of farms and the number of persons who worked them, but also to the extent to which there is a demand for what is produced. For instance, the continued decline in the level of production of starchy roots is not important by itself, and may not necessarily warrant detailed attention for it is possible that production at a higher level than at present rate would result in an over supply as there may not be a demand for more of that product. When one compares Table XI with XII it can be seen that the level of production of protein food is decreasing (as shown in slaughtered table) while the level of demand

TABLE X

ACREAGE OF LAND IN FARMS BY SIZE GROUPS AND BY UTILIZATION, 1961

Size Groups by acres	Total		Cultivated		Grassland		Woodland		Ruinate	
	1954	1961	1954	1961	1954	1961	1954	1961	1954	1961
0 and < 5	249,074	198,000	172,480	118,120	13,827	27,345	7,589	6,062	38,439	28,872
5 and < 25	426,976	389,441	193,923	152,635	53,221	92,483	43,880	31,238	121,095	94,827
25 and < 100	192,411	167,607	50,974	43,406	55,630	53,800	31,664	21,593	48,460	42,948
100 and < 500	204,131	185,596	35,156	40,644	54,540	62,137	52,145	39,417	51,311	37,107
500 and more	716,068	770,786	162,638	190,471	235,081	258,790	160,779	143,058	94,395	151,237
ALL FARMS	1,788,660	1,711,430	615,171	545,276	412,294	495,155	296,057	241,368	353,700	354,991

Source: Agricultural Census, 1961-62, Department of Statistics, Kingston, Jamaica.

TABLE XI

VALUE OF IMPORTS 1962 - 1967
1,000 POUNDS (£)

Food	1962	1963	1964	1965	1966	1967
Meat and Meat Preparations	2,150	2,418	3,160	3,241	3,781	3,371
Dairy Products, Eggs and Honey	2,540	2,741	3,495	3,436	3,523	3,992
Fish and Fish Preparations	2,622	2,670	2,992	2,869	3,563	3,567
Cereals and Cereal Preparations	5,763	6,214	7,355	7,662	8,048	9,304
Fruits and Vegetables	1,384	1,408	1,832	1,425	1,428	1,516
Feeding Stuffs for Animals	952	904	1,034	875	1,268	1,441
TOTAL FOOD	16,195	17,134	20,791	20,388	22,602	24,283

Source: Economic Survey of Jamaica, Central Planning Unit, Kingston, Jamaica, 1967.

TABLE XII

LIVESTOCK SLAUGHTERED: 1959-1966 (lb.)

Year	Calves		Cattle		Sheep		Pigs		Goats	
	No. of Heads	Dressed Weight	No. of Heads	Dressed Weight	No. of Heads	Dressed Weight	No of. Heads	Dressed Weight	No. of Heads	Dressed Weight
1959	1,027	30,810	55,621	22,379,902	2,542	94,054	82,070	6,565,600	217,430	5,000,890
1960	1,066	31,980	55,939	20,749,436	2,659	98,383	85,860	7,469,820	195,000	5,265,000
1961	864	25,920	57,534	24,244,400	2,354	94,160	84,473	6,757,840	127,884	3,836,520
1962	988	29,640	55,852	23,856,100	2,160	86,400	86,293	6,903,440	135,944	4,078,324
1963	781	23,430	57,516	24,513,300	2,097	83,880	82,603	6,608,240	134,440	4,033,200
1964	781	23,430	60,543	25,563,700	1,950	78,000	79,476	6,358,080	180,214	5,406,420
1965	550	16,500	61,212	25,756,700	1,910	76,400	81,370	6,509,600	138,339	4,150,170
1966	550	16,500	61,623	26,051,300	1,695	67,800	80,572	6,445,760	132,697	4,010,910

Source: Annual Abstract of Statistics, Department of Statistics, Kingston, Jamaica, 1967.

has been steadily increasing (as shown in import table). The reason for this is explained in the next section.

Frequently, attention is drawn to the extent to which imports of food are rising. This rise is not wholly a direct result of the fall in local production, but is also partly a way of satisfying the needs and demands of a people whose standard of living is rising. A study of the way in which patterns of production and nature of crops should change in order to meet the demands of the rising standard of living would seem to be a most appropriate exercise at this time.

So far, data from the various tables have revealed the following results between 1954-1961:

1. Total acreage declined from approximately 1.8 million acres to 1.7 million acres or 4.3 percent.
2. Total cultivated land declined from 615,000 acres to 545,000 or 10 percent.
3. Farm population declined from 900,000 to 740,000 or 18 percent.
4. Farm labor declined from 262,000 to 165,000 or 37 percent.
5. Total production declined as indicated in Table IX.

In summary, what has been attempted here is to establish to what degree there is an agricultural labor surplus problem and after analyzing the various data, it appears that there are too many people on farms and the farm labor force is excessive. For instance, from the tables compiled it is shown that in 1961 the farm population was approximately 740,000 and this population was living on 159,000 farms. This means that on an average, there were approximately 5 people to every farm. Since there were 545,000 acres of cultivated land, this

means that there were approximately 1 1/2 persons for every acre of cultivated land. This is indeed a crowded situation. When you compare the man-land ratio, you arrive at similar results. The farm labor force in 1961 was 165,000. This means that there is 1 man for every 3 acres of cultivated land. The U.S.A. has approximately one farm laborer for every 70 acres of cultivated land.

The production table indicates that production has declined between 1954-1961, and at a faster rate than the decline in the farm labor force. The data also show that there was a decline in almost every agricultural product but greatest in the area of starchy roots. The reason for the decline in the starchy root is that they are planted on the smaller farms and it is the smaller farms that showed the greatest decline for the period under study. But why did protein food production decline while at the same time the import of protein food was steadily increasing?

Very briefly, the reason for this general decline in production is caused from the fact that the "law of diminishing returns" was and is asserting itself increasingly, leading to rapidly diminishing increments in agricultural output. This problem of rural over-population has long been recognized and lies at the heart of the Classical Theory of growth and the pessimistic conclusion of Malthus and Ricardo. The illustration of this law will be dealt in Chapter VI.

CHAPTER IV

AGRICULTURAL MARKETING

Introduction

Apart from the per capita income, one of the most salient differences between developed and developing countries is the overwhelming importance of agriculture in developing countries. Countries where 80 to 90 percent of the population depends partly, or entirely, on agricultural production are by no means exceptional. The importance of agriculture for these countries can hardly be overstated, as it determines their socio-economic pattern.

A second datum of paramount importance is that in advanced countries, agriculture has become fully commercialized. The farmer is becoming more and more an entrepreneur whose approach to production does not essentially differ from that of the industrialist. He produces for the market. What is intended for home consumption is no longer very important.

In Jamaica, however, the greater part of agriculture is still subsistence farming. The important fact is basic to almost all rural financial problems in Jamaica. Very few areas remain where the farmer does not regularly need money to provide for some essential social and economic needs and where, for this reason, he is now obliged to grow cash crops or to sell a part of his food crop.

The rapid development in this century of communication media and world trade has increased the felt need of the average farmer in Jamaica for a wide variety of products which he can meet only with money, but his possibilities of securing cash have often not improved accordingly. This accounts for his strong and almost chronic need for money; a role in which agricultural marketing plays such an important part.

In spite of the farmer's increasing needs for cash, subsistence farming still remains a basic fact of rural life. Many farmers in Jamaica often have to use a considerable part of their land for cash crop production. This does not, however, mean that subsistence farming is disappearing. The fact that the greater part of small holdings often is utilized for growing cash crops does not necessarily indicate that the typical farmer is switching from subsistence farming to market production.

What it does mean is that the farmer has been driven into a monetary economy in order to secure the increasing amount of cash he needs. He often has been prone to bring more land into cash-crop production than he can afford, taking into consideration the land resources available and the quantity of food needed by his family. Therefore, the marketing of a large proportion or even of the whole of his food crops does not indicate that the farmer has a food surplus.

The indication of food deficits is further borne out by the fact that in Jamaica the price of food grains is considerably higher in the months preceding the harvest than in the period immediately following it, sometimes 30 percent or more. This clearly suggests deficits. This phenomenon rather indicates that the chronic need of cash is so

pressing that the farmer is compelled to market too much of his crop, knowing very well that a few months later he will have to buy back at a much higher price the rice or the yams which he had sold at a low price shortly after the harvest.

Experts in the area of nutrition have not failed to make clear that only too often such "marketing" boils down to exchanging good food for an equal quantity of inferior food. A similar feature has been noticed in those cases where farmers exchange the better seeds lent to them in kind by governments, co-operatives or other organizations, for twice the quantity of food grains. Frequently, it can be said, therefore, that under such conditions the level of nutrition goes down in areas where a great proportion of the food crop is marketed.

Many observers have also reported that the farmer often reacts to an increase in the price of food grains by marketing less of his production, because he can afford to keep more food for his own consumption. It has rightly been observed, therefore, that in the eyes of the subsistence farmer, it is the product's use value and not its exchange value that counts.

The basis of existence, therefore, of the great majority of the rural people in Jamaica is subsistence farming, and it is obvious that there is no real price basis in the sense of cost price,[1] at least for subsistence crops.

The cash crop situation is not essentially different, although it is admitted that usually cash crop production involves the farmer in

---

[1]The term "cost price" is to be understood here as theoretical cost of production, taking into account, e.g., the cost of labor of the farmer and his family, a proper return for the capital invested in his land, etc.

higher "money expenditure" than food-crop production and is, consequently, more risky. As long as cash crops continue to be grafted on subsistence farming and, therefore, combined with the raising of foodcrops for home consumption, the price calculation for cash crops must boil down to determining the amount of cash the farmer has to spend to raise his crop.

But, why is it that all attempts to change the basis of rural life in Jamaica from subsistence farming to a full-fledged market system based on profit seeking has so far yielded such modest result? Agricultural production in Jamaica continues to be based on, and to be directed toward, the satisfaction of the direct needs of the farmer and his family, a phenomenon largely due to his pattern of life and his scale of values, which are different from those of his counterparts in advanced countries.

The strong centuries -- old uninterrupted tradition into which he has been born prescribes the main norms for all man's activities. Not only the question as to what, but when will a crop be produced is decided by tradition. It also prescribes how much should be produced, since the pattern of consumption is as traditional as the pattern of production.

The traditional pattern of life also largely dictates the quantities of each agricultural product to be consumed. This feature is the more important since the traditional needs for which production has to provide are limited and rigid, and where the self-reliance of the family in economic matters has been the basis of life for many centuries. Not only the range and quantity, but also the quality of the needs cannot be other than modest.

Marketing System[2]

By far, the greater portion of the food consumed in Jamaica is sold through some 92 parochial markets and probably a larger number of roadside markets. The "higgler system" has always been a vital part of this marketing system.

The Higgler System

Traditionally, most of the foodstuffs produced for domestic consumption in Jamaica has been marketed by "higglers". The term "higgler" is generally used to describe a trader in agricultural commodities. Some of the types of higglers found in Jamaica are:

1. those who sell the produce grown by someone in their own household;
2. those who purchase all the produce they sell. These higglers may sell to other higglers who function principally as retailers or they function as retailers themselves, and
3. those who purchase some of the commodities they sell while a portion is produced by members of their own household.

Higglers are well established in the business of assembling small diverse lots of agricultural commodities from remotely located farms and channelling them to various outlets. This system is considered costly and inefficient, but provides a means of livelihood and indeed much recreation for many people. Some higglers advance credit to farmers, some assist in reaping the commodities and observations indicate that

---

[2]The material presented in this section is based on the paper, Marketing of Agricultural Commodities Produced for Domestic Consumption, by Johnson and Coley, Ministry of Agriculture, Kingston, Jamaica, 1966.

they tend to pay higher prices to the farmers than some of the more organized groups of farmers, including government marketing agencies that are purchasers of surplus commodities.

Some of the major weaknesses in the higgler system are:

1. the small quantities in which most of them deal increase the costs of marketing;
2. when supplies are scarce they may buy all the farmers have to offer, but when supplies are plentiful, higglers are selective and large quantities of commodities may remain unmarketed;
3. a market price as such seldom exists for a product, since each sale price is based on bargaining between the buyer and seller;
4. travelling cost for groups of higglers are much higher than if bulk handling were done;
5. poor transportation methods result in substantial spoilage and damage, and
6. higglers perform no processing or packaging functions.

The Government Marketing Department

This Department was established during World War II to administer the government's guaranteed price schemes which were effected to foster local food production in order to fill the gap created by the scarcity of imported foodstuff. However, it was subsequently found inadequate, limited in scope, and was not providing the services necessary to foster increased food crop production. Some of its limitations were:

1. the inability to handle a large enough volume of supplies;
2. the delays in payment for produce delivered by farmers;
3. the lack of necessary packaging and processing facilities;
4. the lack of proper grading and standardized techniques;
5. that it operated largely on the basis of surplus;
6. that selling operations were restricted mainly to government institutions; and
7. the lack of purposeful policy formulation to encourage production.

The Agricultural Marketing Corporation

The Agricultural Marketing Corporation (AMC) was established on December, 1963, under the portfolio of the Minister of Agriculture and Lands. Its objective is to initiate and maintain an efficient system of marketing, and given power to:

1. provide and maintain adequate marketing outlets for agricultural produce;
2. to buy and sell agricultural produce;
3. to provide for the collection, transportation, storage, grading, and processing of agricultural produce; and
4. to import and export agricultural produce.

In April, 1964, the Ministry of Agriculture and Lands (MAL) obtained the services of an Agricultural Marketing Advisor from Israel to assist in establishing the organizational framework of the corporation on a commercial basis and in guiding the corporation in the use of proper marketing techniques.

In addition to the Central Branch, which is headquartered in Kingston, the AMC has branches located at strategic points in the other parishes. These branches are supplied with produce from 140 Buying Stations.

Facilities

The facilities of the AMC include:

1. a central packing house located at the headquarters in Kingston. Most of the business of the AMC is transacted from this point;
2. a corn meal factory with a potential production of 300,000 bags of corn meal per annum;
3. a potato (Irish) storehouse with cold storage facilities -- capacity of 2,000 tons; and
4. five branch offices each of which operates several buying stations.

Operation of the Corporation: Trading

The corporation endeavours to purchase all marketable produce which farmers offer for sale. Purchases are made on three bases:

1. Guaranteed prices. Government determines from time to time crops for which guaranteed prices will be paid and the actual price to be paid. Currently, corn (maize) is the only crop falling within this category.
2. Contracts at stipulated prices. The AMC contracts with farmers and farm organizations to purchase certain commodities at stipulated prices. This stipulated or fixed price was

changed to a minimum guaranteed price on April 1, 1965. Farmers may receive a higher price than the stated minimum. This arrangement is intended to stimulate farmers to produce crops which are not now produced in large enough quantities. There are 11 crops now covered by contract: carrots, onions, sweet corn, plantain, pumpkins, melons, yampies, white yams, red peas, congo peas, and strawberries.

3. Open market trading. The croporation buys at prevailing prices all crops for which there is a market. Purchases are made on a cash basis at the point of delivery. In most cases the point of delivery is the buying station.

Volume of Trading

AMC has been in existence for five years and there has been a sizable increase in the quantity and value of commodities traded. As part of its policy, the AMC centers trade in certain commodities (e.g. table eggs and ginger) to stabilize the market. In addition, where the necessity arises to import certain items, e.g. red peas and Irish potatoes, which have been placed on specific license to encourage local production. The government gives the AMC a permit to import specified quantities of these commodities for release to the trade.

The AMC stores and freezes eggs and processes certain commodities for export, e.g., sweet potatoes, negro yams. The AMC is also endeavoring to provide certain services for farmers. The main service so provided has been in procuring goods -- Irish potatoes (imported seeds) and red peas. The service is supposed to be self-supporting.

Financing

The operations of the AMC are financed by the government, but the intention of the AMC is to operate as efficiently as possible. Since it is the AMC's policy to purchase all marketable commodities produced by farmers, it is inevitable that significant losses will be experienced. These trading losses are likely to be reduced gradually as the AMC becomes more firmly established and as farmers begin to relate production to consumer requirements. The major losses incurred to date have been due to spoilage, inadequate cold storage facilities, trading in commodities for which the demand is low, and unexpected price changes.

The losses on trading, however, should be evaluated against the volume of business carried on. Current overhead expenditures are high in relation to the magnitude of business transacted. Inadequate facilities are partly responsible for some of the losses incurred. The organizational structure of the AMC has recently shown sign of improvement and the deficiencies have been given consideration. For instance the following steps are now being taken to correct this:

1. Construction of a wholesale Terminal Market has been completed recently, resulting in increased storage space, receival area, etc., as well as, increased and improved cold storage facilities.
2. Plans are also being taken to increase the number of branches and number of buying stations.
3. With the aid of the Marketing Advisor, proposals have been made to strengthen the organizational structure of the AMC.

When all these improvements shall have been made, the question is whether the AMC will be able to attract the volume of business which

will make it an economic venture. Recent reports indicate that delivery to the buying stations has been inadequate. This point will be commented on in the last section below.

The primary objective of the AMC (a non-profit organization) is to stimulate domestic food production. This objective is not necessarily consistent with one of covering operational costs. Steps can and must be taken, however, to insure that it operates as effectively as possible.

Relationship with Other Agencies

It is the Minister of Agriculture and Lands who determines the policy of the corporation, however, the AMC receives the cooperation and help from other departments such as Extension Service, Crops and Soils, and Agricultural Economics and Statistics.

Because the corporation has no qualified technical staff of its own it is necessary not only for close cooperation to exist between itself and the above departments, but also to rely on them for services in certain specific areas.

For instance, the corporation depends on the Extension Services Department for guiding and assisting farmers in developing their holdings, teaching them good animal husbandry practices and assisting them in making the best use of the facilities (including marketing) available for development. In particular, the Department has the responsibility of encouraging farmers to grow those crops which can be grown successfully and for which a market can be found either through the AMC or otherwise. The Extension Service also administers the subsidy and loan schemes.

The Crop and Soil Departments have the responsibility for the research work on crops through its Division of Agricultural Chemistry, Agronomy and Plant Protection. Until recently, most of the research work has been concentrated on crops grown mainly for export. With a change in emphasis and with the devotion of greater attention than previously to crops produced for local consumption, it became necessary for this department to take specific steps to bridge the gap in knowledge concerning the production of non-export crops.

The Department of Agricultural Economics and Statistics has major responsibility for the collection and collation of various types of data relating to production such as quantities, costs, seasonality, distribution by areas, and availability of substitutes. It also examines the demand situation and advises MAL on matters relating to the importation of agricultural commodities. It also has the responsibility for the collection of data in the preparation of a series of farm gate prices.

To facilitate and improve operations, the Forecasting and Market Intelligence Services were established within the Department of Agricultural Economics and Statistics to enable it to procure information not only to meet broad responsibilities, but also to assist the AMC in particular in a number of its operations. In this respect the Department prepares:

1. monthly forecasts and estimates of production;
2. marketing intelligence reports -- market prices and supply conditions in parochial markets; and
3. series of farm gate prices.

The Department also prepares cost of production data which are used by the AMC as a basis for setting prices offered for commodities purchased.

The AMC also maintains liaison with the Agricultural Information Service, a division of the Ministry of Agriculture and Lands, which assists by keeping farmers informed (through various media -- pamphlets press, radio and television) of the various activities of the AMC.

The AMC cooperates with other Ministries of Government. The most important of these is the Ministry of Trade and Industry with which there is liaison in relation to determining import licenses for certain food items and food processing. There is also liaison with the Ministry of Local Government which is responsible for the administrative policy relating to the Parochial Markets.

The Parochial Markets

These are essentially the markets located in every town of significance. They are built and run by the "Parochial Board" (under the local government) of each of the 14 parishes. Local farmers take their produce to the market and upon payment of a fee to the market officials may use the facilities of the market.

While supermarkets have recently begun appearing in Jamaica, they are confined to the larger towns and rural people continue to rely entirely on parochial markets to do their marketing.

These markets long have played a primary role in the marketing of food crops in Jamaica. At least 60 percent of the food consumed locally passes through these markets in which the "higglers" still reign supreme. The markets, for the most part, have poor facilities and the services

provided are largely sub-standard. If the AMC is to fulfill its role of improving marketing in general, it must endeavor to influence the operations of these parochial markets in many respects.

The AMC is not only interested in seeing that farmers receive a fair price for what they produce, but is also interested in seeing that the consumers get a fair deal in terms of the prices which they pay.

There is ample evidence to indicate that once farmers produce the commodities required (varieties, qualities, etc.) and these are offered for sale in a proper form, they will provide adequate replacements for relevant imports. This implies the necessity for satisfactory grading of commodities and the setting up of acceptable standards.

A Brief Description and Evaluation of the Other Marketing Channels

Supermarkets

Supermarkets have been operating in Jamaica during the last 13 or so years. The term supermarkets as applied in Jamaica covers true supermarkets, as well as businesses which are essentially transformed grocery stores. The number of true supermarkets is increasing. They now perform a very sueful function in that their displays and packaging of food items provide an attraction for customers which is not found elsewhere. In fact, they have made a real contribution in demonstrating the existence of a quality market for several items of food -- even if some of these such as carrots and iceburg lettuce are imported.

Supermarkets generally obtain their supplies from farmers, higglers, agents, and dealers, but with the establishment of the AMC many supermarkets are now obtaining some of their supplies from this source. When

supermarkets first started in Jamaica, they did very little packaging and the marketing services, especially for food crops, were not of a high standard. Demands for certain services by people who have visited the United States of America, Canada, and the United Kingdom have created pressures towards improving the services afforded. These together with the added advantages associated with supermarkets' shopping have increased the number of supermarket shoppers. This tendency is expected to continue.

In more heavily populated areas like Kingston, with a population of over 450,000, there is real potential for the expansion of the marketing of food crops through supermarkets. The converse is likely to be the case in the rural areas where the relatively small volume of business available is one of the important factors which limit the competitive position of supermarkets vis-a-vis, the parochial markets in providing outlets for food crops.

Agents and Dealers, etc.

There are a variety of agents and dealers who handle food items. In the past, agents (largely the merchant men) have handled only those items which could be imported (e.g. carrots, lettuce, colory) and have been most reluctant to handle local produce of comparable quality even when available.

Steps have been taken to correct this by improving the quality of local produce offered for sale and by restricting imports. Few of the agents and dealers, however, have either developed large supplies or improved their handling through better transportation, cleaning, packaging, etc.

The relatively small quantity of produce handled by some agents and dealers has resulted in high costs to the consumers much of which covers margins to the various middle men and profits to the sponsors. With the establishment of the AMC, however, some of them have been displaced.

Livestock Products

While this thesis is intended to deal mainly with crops produced for local consumption, some observations can be made concerning livestock products such as eggs, milk and meat.

Eggs

It is estimated that about 70 percent of the eggs produced in Jamaica passes from the producers through supermarkets to the consumers. Small quantities pass through the AMC, the parochial markets, roadside markets, and grocery stores. The remainder is sold directly to institutions and individual customers.

The eggs that are sold through the supermarkets are usually graded and packaged, but this is not necessarily true in case of eggs being sold through other channels. Initially, grading was synonymous with weighing. Proper handling and sorting on the basis of cracked eggs and dirty shells was not being done. Grading systems, however, have now been improved considerably and are more widely adopted in the marketing of eggs than in the marketing of food crops for domestic consumption.

Many of the larger egg producers operate on a contract basis in which they are supplied feed and medication, but they themselves provide

the labor and housing facilities for the birds. Many of these producers are doing much of the necessary grading.

The AMC purchases eggs principally in the time of glut for the specific purpose of stabilizing prices so as to prevent considerable loss to producers.

The Department of Agricultural Economics of MAL prepares annual forecasts of egg production towards the end of each year for the following year. These forecasts are revised at intervals and provide the basis for the final estimation of production which is released to the general public. They serve as guides to the AMC, egg producers, and merchants who are associated with the business. Marketing Intelligence studies pertaining to eggs are also done by the Department to provide regular information on quantity and prices of eggs available.

Milk

Milk produced in Jamaica is sold either to Jamaica Milk Products, Ltd., one of the pasteurizing plants, or directly to the final consumer. This establishement (JMP) is the largest single purchaser of milk in Jamaica. It operates collection services in any part of the island where sufficiently large quantities of milk are available, provided terrain and roads are suitable. The company pays the basic price of 7½d per quart for milk, but offers premiums for butter-fat content, low acidity, clean milk, chilled milk and milk from farms complying with health regulations. Farmers are, therefore, able to secure a maximum of 10 3/4d per (imperial) quart.

Jamaica Milk Products Ltd., processes most of its milk as condensed milk. Some of the milk supplied to JMP is fit for consumption as fluid

milk, but absence of cooling facilities and other problems related to distribution of milk forces some producers to sell to the JMP.

There are at present two pasteurizing plants in the corporate area Dairy Farmers Ltd., and Cremo Ltd. There are two others on the North Coast. These plants purchase milk from farmers, pasteurize, homogenize, package and/or bottle it for final consumption. Some of the milk is used by these companies for the manufacture of ice cream and other milk products. The farm gate price for milk used for these purposes averages about 1/2d per quart. Retail prices to the consumer (in the retail houses) is 2/6d per quart.

Most of the milk produced in Jamaica is sold by the producer to the final consumer, mainly by house to house deliveries. Since milk is easily contaminated, the government has enacted milk legislation under the Public Helath Law for safe-guarding the health of the consumer. An important part of this legislation is the requirement that all milk supplied for human consumption must be from cows that have passed the tuberculin test within twelve months. Raw milk for liquid consumption must be sold in stoppered bottles or containers having a suitable cover. Distribution of milk from other containers by means of dippers of any kind is forbidden.

With proper planning of production and marketing, milk production in Jamaica can easily be doubled. It is estimated that current production is around 34,000,000 quarts annually.

Meat

In Jamaica, meat is sold through supermarkets, parochial markets, roadside markets, meat shops, and grocery stores. Meat passing through the supermarkets is generally cut and packaged; that from the meat shops is cut but not packaged; while in the parochial markets where poultry meat is not sold the sides of the animal carcass are suspended by a wire hook over a meat stall and from these sides the cut the consumer desires is made. This situation also prevails in roadside markets and groceries.

All meat that is sold for human consumption must satisfy a prescribed Public Health examination. In the rural areas each butcher kills his stock which is tested for fitness by trained Public Health Inspectors. If the meat satisfies the conditions specified by law it is stamped as an indication of fitness and made ready for sale.

In the corporate area, all animals are slaughtered at the abattoir where the carcasses are examined and have to be proven free from communicable diseases before they are released to the trade.

The Broiler Industry is well organized both in terms of production and in marketing. There are three broiler companies in the island. These companies rear their own broilers while they also place birds on the farms of various farmers to be reared on a contract basis. Mature birds must be marketed through the company which generally pays the farmer for them on a point-spread basis. These birds are then killed, plucked, and packaged by the company and released through various sources to the consumer.

The broiler industry provides, perhaps, the best examples of contract farming together with both vertical and horizontal integration

of operations. The companies provide feeds, medications, etc., while farmers provide the housing facilities and labor.

Jamaica Does Have the Markets[3]

After reviewing the data given above and the facts now outlined below, I have come to the conclusion that there are adequate marketing facilities in Jamaica, both at local and export levels. Let us examine the facts to see how I arrived at this conclusion.

In Chapter III, it was pointed out that for the period under study, there was a steady decline in total production while at the same time there was a steady increase in import of the items that were declining in production. This decline was attributed mostly to the influence of "diminishing returns" and to a lesser degree, to a steady shift in the mix of the consumer's basket. This shift was to more protein food which could be added only from imports.

But, why should an agricultural country like Jamaica get involved in the import of agricultural products? This answer lies in the fact that our traditional means of production cannot keep pace with a country that is rapidly outgrowing its means of subsistence. To further compound the situation, Jamaican farmers are holding steadfast to the production of traditional crops while consumers are inexorably developing the sophisticated taste and preference of developed countries like the U.S. and Great Britain.

---

[3]Some of the data presented in this section are based on various articles printed in The Daily Gleaner, Kingston, Jamaica.

If farmers could be influenced, by persuasion and help, into changing both their crops and production techniques, they would find that there is an adequate market for all they can produce.

Let us look at the export crops as a group. The island's production of sugar last year has been estimated to be about 460,000 tons, but, it is well known that if the output had gone up to 500,000 tons or more, a market would have been found for all of it. Two years ago or so, disposal of any output over 425,000 tons offered something of a disadvantage in that the excess over this went to Canada, which paid a world price much under $56 per ton, plus a preference which worked out to about another $15.20. Meanwhile, the local production cost price was up to $112.00 per ton. The world price went up to $67.20 per ton in 1968, and the experts have forecasted that it will increase to $84.00 by 1969.

The price may well be higher than this since there are indications that sugar production the world over is shortening in relation to consumption. Jamaica can safely expand output to 550,000 or 600,000 tons. The question is, can production reach that figure with the existing state of the arts?

Let us look at bananas, as another example. Under agreement made with the Windward Islands, Jamaica should have supplied last year a minimum of 200,000 tons of fruit to the United Kingdom and should have had enough left over to take up any possible, short-fall by the Windwards. As things turned out, the Windwards fell short of their own allotment by well over 20,000 tons, and Jamaica's production went down by 8,000 tons. The British market at the same time had grown slightly.

The United Kingdom is not the only profitable market now open to Jamaica's bananas, although it remains the best. Before devaluation, the price on the Italian market was just a little below that required to breakeven, but now, with the local currency valued at five-sixths of its former level, bananas sent to that outlet pay their way and leave a slight profit. What is wanted is sufficient fruits to send to Italy.

The same situation also applies to citrus. Publications show that more could be sold if the production was available. In 1967, New Zealand, Canada, West Germany, and to a certain extent the United Kingdom offered opportunity for the disposal of a much larger quantity of fruit than was actually available for sale. Devaluation has improved the competitive position of Jamaica's citrus in outlets like Canada and West Germany, and even greater opportunity for sales has arisen in the United Kingdom, where less United States citurs will be bought from now on because of the currency situation. Far more citrus than is in production now could be sold at profitable prices under current conditions.

The analysis applying to the three major export crops also applies to lesser ones, such as coffee, cocoa and even anatto. In the case of coffee, devaluation has done little if anything to enhance the prospect that existed before. However, it would have been possible to sell as much as ten times the amount of Jamaican coffee actually disposed of each year for the past two decades at favorable prices, but the coffee has not been available.

Jamaica produces a premium cocoa which, even during the days when the price for standard fermented cocoa was below $14.00 a hundredweight

found ready disposal on world markets at well above this figure. The price for standard cocoa is $31.00 now, with prospects of further improvement.

There is not enough anatto production to meet both the domestic demand as well as a growing export market. In December, 1967, scientists from the British Ministry of Overseas Development visited the island to look at the prospects of increasing the production of this crop, among others classified as spices and vegetable coloring matter.

Figures from the Bureau of Statistics are not available, but it would be surprising if food importations last year went below the $56 million mark. Of this amount, it can safely be calculated that $28 million or more were for protein food -- beef, dairy products, fish stuffs, pork products and so on. Also, there probably was some $9.5 million worth of vegetables and pulses imported which could either be produced on the island, or for which a local substitute could be found.

Again, in the area of domestic food crops, production is the problem rather than outlet for what is produced. It has been reported time and time again that the AMC warehouses are functioning at half capacity because of inadequate supply.

Implication

If the existing markets for Jamaican crops, domestic as well as exports, could be exploited to the fullest by increasing the level of production, there is little doubt that many millions of dollars would be added to the national revenue. When products such as beef, pork, and dairy products develop and the production of crops such as ackee, mangoes, Irish potatoes and yams is expanded, the products now classified

as purely for domestic utilization could grow into sizable exports, especially to Jamaican citizens in the U.K. and the U.S.A.

It must not be supposed or concluded that merely because a strong market possibility exists, that the farmer has nothing else to do but to go ahead and produce. The public records in Jamaica are virtually full of cases of production efforts that were started to satisfy certified demand on the island, but failed because of inadequate marketing channels. A great deal of planning of both production and marketing needs to be done.

Recently, the Prime Minister and his cabinet have decided to give livestock growers a subsidy. This a part of a plan to increase poultry and pig production in the island to eliminate the imports of protein. Undoubtedly, expansion is already taking place as a result of the incentive, but steps will have to be taken to insure that there is adequate extra production, and that producers can actually sell what they produce.

CHAPTER V

AGRICULTURAL DEVELOPMENT

Introduction

The development of the agricultural sector of Jamaica, for the period under study, was insignificant. While total agricultural production for the period declined, the use of improved technology and fertilizer on medium and large farms increased. However, smaller farms, which are in the majority, did not share this improvement. Thus the overall production pattern showed a decrease.

In Chapter III it was pointed out that if the number of farms in a particular size group decreased by a certain percentage, then production for that size group normally would decrease by the same percentage if productivity remained the same for each farm or if the acreage devoted to crops on the remaining farms remained constant. However, in most cases, the percentage decline in production was greater than the decline in the number of farms for the size group, indicating that either productivity or the number of acres devoted to crops or number of trees of a particular type, etc., must also have decreased on the remaining farms.

We also saw in Chapter III, various factors which may have caused the decline and it was concluded that the "law of diminishing returns" was the most important contributing factor. The application of labor to land closely approached zero in marginal returns, and as more labor

was added, marginal returns became negative and total returns declined. However, if modern means of production, such as the use of fertilizer and improved technology had been used, total production might have increased or at least decrease in output might have been avoided. But, since neither of these happened, one must conclude that production development was insignificant for the period under study.

To get a better understanding of the agricultural development situation, it may be best to approach the problem from what it whould be and then see how Jamaica fares. This is better done by stating what the "objective of agricultural development" should be and then compare and contrast it with Jamaica's development.

The Objectives of Agricultural Development

Many objectives may be given for economic development: providing for economic independence, reducing imports, industrialization, improving the standard of local production, and reducing unemployment. But it would be better to establish a general and higher goal for economic development; the improvement of the general level of living.

If the objective of the economic plan is for the betterment of the living conditions of the people, then what is the aim of the agricultural portion of the plan? Obviously, the main objective is the same. The agricultural development program is a integral part of the general plan and its aims should be completely distinguished. These aims are as follows:

1. An increase in agricultural production sufficient to meet public requirements, especially considering the population increase.

Because the population of Jamaica has been increasing by approximately 2 percent annually, the annual increase in agricultural production should exceed the population increase in order to upgrade the present low standard of living. But if agricultural development is to provide for an annual increase in production, it would mean a change in strategy by the planners, since production has been declining while population increases.

2. To increase the income of the farmers by eliminating disguised unemployment and idleness and by increasing the yields of agricultural crops through the application of additional capital extension of agricultural techniques.

According to calculations made, if the total value of all agricultural products of Jamaica were to be distributed only to those who live by agriculture, the annual income of farmers, as in other underdeveloped countries, would still be less than most of the other classes.

It should be noted that the calculation of agricultural product price with due consideration to the consumption problem and the production expenses, etc., is extremely difficult.

The income of the farming class in Jamaica, is much lower than that received by workers in other areas of private industry (see Table XIII). The essential reason for this low income is the chronic or concealed unemployment, together with low profit and inefficiency of agricultural production. On an average, farmers are idle for half of the year. Reducing the number of workers on Jamaican farms by 50 or 60 percent would probably not affect total output.

The yields and efficiency of agricultural operations are low due to the kind of farming, lack of modern equipment, shortage of water,

TABLE XIII

AVERAGE EARNINGS OF WORKERS IN LARGER ESTABLISHMENTS BY QUARTERS - 1965

Industry Group	Quarters			
	March	June	September	December
	-- Jamaican Pound (£J) --			
Agriculture	4.1	4.2	3.5	3.8
Mining	20.6	20.6	21.4	21.9
Manufacturing	7.4	7.4	7.4	7.7
Private Construction	10.6	9.9	10.2	10.6
Electricity	17.0	17.4	17.2	18.8
Commerce	11.6	11.9	12.1	12.5
Transportation, Communication, and Storage	9.6	10.4	9.5	10.0
Services	6.9	6.8	6.5	6.9
Total Private	7.5	7.7	7.8	8.2
Government Construction	3.8	4.2	3.8	
Government Sanitation and Water Supplies	4.2	3.9	4.1	4.3
Total Government	3.9	4.2	3.7	3.7
ALL GROUPS	7.2	7.3	7.3	7.1

Source: Department of Statistics, Kingston, Jamaica, 1965.

and non-use of improved seeds and fertilizers. Therefore, the main objective of an agricultural development plan of Jamaica should be to increase the income of the farmers by increasing efficiency, by augmenting the productivity of agriculture through mechanization, and the use of improved seeds, fertilizers, etc.

C. Another objective of agricultural development should be that of keeping pace with the total economic development of the country. Attention must be paid to the fact that agricultural development and industrial development have a definite relationship and complete co-ordination should exist between them.

Agriculture, by providing food, manpower, markets for industrial products, and supplying raw materials, can render substantial aid to the development of Jamaica. In view of this relationship and importance, the agricultural development program should be drawn up in such a way that the establishment of new factories are in line with the supply of primary materials furnished by the agricultural sector.

In the case of manpower, the increasing efficiency of agriculture through the utilization of new agricultural methods would hasten the departure of a substantial number of underemployed agricultural workers for employment in the industrial sector. In this way, the manpower required for the development of industry will be assured.

As agricultural development proceeds, the sales of industrial goods will increase because of the increasing need for machinery and other industrial goods. As the changes take place in agriculture, an improvement should occur in both the living and the income standards of the farmer class, and as the consumption level of farmers goes up, the

demand for industrial goods will increase. Thus, development in agriculture should facilitate a general rise in the living standard.

Unfortunately, agricultural development in Jamaica has not yet reached the stage where it can play the part outlined above.[1] With the present state of the arts there will have to be a tremendous improvement in technology and the use of fertilizer, etc., before the agricultural sector can have any favorable influence on the general living standard of the economy.

Generally, in developing countries (including Jamaica), farmers comprise between 60 and 80 percent of the population. After industrialization and agricultural development, this proportion is expected to decline to less than 50 percent.

Industrialization of Jamaica began in the 1950's with the discovery that Jamaica had the largest known deposit of bauxite. Figures taken from 1961-62 Agricultural Census show that between the census 1954 and that of 1961, the total farm population declined by about 160,000 from 900,000 to 740,000 persons. Since the population was 1,476,923 in 1953 and 1,624,400 in 1961, this means that the proportion of people on farms declined from about 64 percent to about 46 percent.

Therefore, it can be concluded that without agricultural development and an increase in farm income, the sale of industrial products might be confronted with difficulties.

---

[1]The stages of development will be discussed in a later section.

Factors Required for Agricultural Development

There is little doubt that the indispensable factor in the development of agriculture is in the designing and preparing of a comprehensive plan which causes agricultural development to progress in parallel with other development programs. It may even be said that an agricultural development program which is not co-ordinated with other programs, would likely end in failure.

An agricultural development program requires that certain natural, technical, organizational, economic, and legal factors be favorable. In short, an environment in which all the necessary factors are available and in which all obstacles and difficulties have been removed.

Human and Natural Factors

Among the factors necessary for agricultural development, land, water, and manpower are by far the most important. Because approximately 50 percent of the labor force in Jamaica is working in agriculture[2] and because this percentage of agricultural workers is in surplus of what is required for a viable or efficient agriculture, there would be no shortage of labor in expanding programs of agricultural land-use.[3] This development coupled with non-agricultural development based in the rural areas, will help to eliminate some of the unemployment and at the

---

[2]The total labor force, according to the Census of Population, 1960, was 381,658, of which agricultural labor was 190,774.

[3]Total farm land in 1960, was 1,711,430 while the total cultivated land was 545,276. In percentage, this means that 32 percent of the land was cultivated while the rest was in grassland, woodland, ruinate and others. Agricultural Census, 1960-61, Ministry of Agriculture and Lands, Kingston, Jamaica.

same time bolster wages in agriculture. This moment will be the natural prelude to agriculture development.

The Government of Jamaica seems to be recognizing this problem because there have been discussions recently about how to get entrepreneurs to locate their plant in the rural areas. This apparently will require more incentives than are now being offered the industrial sector. The country is about to begin a second five-year plan and it is at this stage of development that a plan must be implemented to bring the agricultural sector in line with the industrial sector. It may well be that the government will have to be the pioneer as it is in marketing.

Capital Factor

A substantial difficulty in agricultural development is the problem of investment. In the first place, the income of the farmer's class is too small to permit any surplus for investment. However, the agricultural development program should not be postponed pending the increase of saving and investment of the class.[4] Secondly, in Jamaica where an important part of the national income is obtained from agriculture, if the proportion of investment in agriculture is raised in comparison with other branches, the increase of agricultural income would probably be raised by the same percentage. Table XIV indicates both the percentage contribution to Gross Domestic Product and the expenditure on selected sectors. The table also shows that while the

---

[4]In Chapter VI it will be explained how the rate of saving and investment in agriculture could be increased when the surplus labor is shifted out.

TABLE XIV

PERCENTAGE CONTRIBUTION OF SELECTED SECTOR TO G.D.P. AND EXPENDITURE ON SELECTED SECTOR, 1962-67.

Industrial Sector	Percentage Contribution Each Year					
	1962	1963	1964	1965	1966	1967
Agriculture	12.0	13.4	12.5	11.6	11.6	11.4
Mining	9.6	8.9	9.4	9.7	9.6	9.6
Manufacturing	13.7	15.3	15.3	15.0	15.4	15.1
Construction	11.3	10.5	10.7	10.7	10.7	10.9
Distributive Trade	16.0	15.1	14.9	14.4	14.1	14.2

Sector	Expenditure in Jamaican Pound* (.000)				
	1962-63	1963-64	1964-65	1965-66	1966-67
Agriculture	2,037	2,118	2,727	2,741	2,913
Education and Social Welfare	9,326	9,326	10,926	12,321	12,978
Public Health	4,812	5,066	5,794	6,050	6,241
Trade and Industry	380	442	440	430	538
Communication	5,096	5,314	5,783	5.525	5,762

Source: Economic Survey, Central Planning Unit, Kingston, Jamaica, 1967.

*Jamaican Pound (£) = $2.80.

expenditure on agriculture had remained relatively constant, expenditures on other sectors have been increasing.

For the period 1966-67, the increase in agricultural production was 1.8 percent over the previous period. Since the population increase for the same period was 1.9 percent, there was no per capita increase in agricultural production.

A closer look at the data also reveals that 6 percent of the total investment was made in agriculture and this resulted in a 1.8 percent increase in production. This means that either the investment was too small to stimulate significant growth or it was not properly administered. One might suspect an element of both were in progress but more so for the former. At this stage of development, the agricultural sector needs massive investment to get a positive response.

Thirdly, in an underdeveloped country like Jamaica, the rate of discount is too high in the market (the interest rate is between 12 and 20 percent). Because of this high interest rate and the profitability of the non-productive transactions, such as speculation in land, importation of luxury goods from abroad, etc., the entrepreneurs, generally, are not ready to invest in the so-called productive enterprises, especially agriculture.

The preparation of a better agricultural development program, giving due consideration to the above mentioned points and providing for closer control and supervision of the government, is needed. Greater government investments and financial aids to rural agricultural co-operatives is also badly needed.

Land Ownership and Land Reform Problems[5]

There is little doubt that if farmers owned and cultivated the land and were permitted to sell the product of their labor, they would manifest greater interest in farming operations. This interest would be noticeable in their desire to co-operate in increasing their production.

In some cases, the problem of ownership rights in land probably should be separated from the problem of technical operations. For some types of cultivation, the larger farms may be more efficient than smaller units, as in the case of sugar cane and bananas. Also there can be a better utilization of agricultural machinery, since for these larger units, agricultural mechanization may be more practicable. But this matter should not prevent the limitation of land ownership, the adoption of a land to the cultivator policy, and the formulation of co-operatives ventures where petty land-owners of like units can achieve some of the efficiencies of large farm units.

The maximum area of land that should belong to a farmer is a complicated and technical problem. No fixed rule should be adopted in this respect, but the size should be based on social factors, fertility of land, kind of cultivation, etc.

In case a law on the distribution and limitation of ownership of land is enacted, provision should be made for servicing the needs of the small land owners. Institutions should be established to act in the

---

[5]Some of the data presented in this section are taken from various articles printed in The Daily Gleaner, Kingston, Jamaica.

place of the landlords in order to enable these small landowners to satisfy their needs.

In 1966, the Jamaican Legislature established a Land Development and Utilization Commission. Its task is to seek out every significant area of idle land existing on properties of 100 acres and over, and to use such measures as the law provides to bring those idle areas into use.

The whole concept of getting idle land developed and utilized fully rests on a power deeply entrenched in the Land Development and Utilization Act. The power is that, if a land holder proves unable or unwilling to develop and utilize his idle land, the Commission can step in and take possession of it by either lease or outright purchase at a fair market price, and proceed to make such arrangements as it finds feasible for the desired development and use.

Attention must be paid by the Commission, however, to the ability and willingness of the land holder to carry out necessary development and use himself. It is in pursuit of that attitude -- willingness -- that the Commission operates, and it is out of this principle that problems have arisen.

For instance, one type of land holder that the Commission interviewed is one who inherited the property on which the idle land is found. He may have been able to earn something from it, but has no intention or idea, and in some cases, no ability to undertake the sort of planning, financing, and expertise entailed in making the idle land more fruitful.

The landowner of this type says in substance,

> I know nothing at all about agriculture and the way in which you want me to put the land to use, and anyway, I do not have the means to participate in such a venture. If the government wants the land to be used, the government can have it. All I want is to be fairly compensated.

Perhaps there is the addition that the money so obtained can be put to use to earn income that the property never has done.

A second type of landowner with which the Commission deals is one who is very well aware that the government has a purpose in wanting idle lands utilized, but is not inclined to utilize it himself. Nevertheless, he is determined that if his land is going to serve the government's purpose, then the government must be prepared to pay dearly. This type is the opposite of the first one just outlined.

As far as these two types are concerned, the Commissioners feel that no great difficulty is presented. The law clearly provides that where an owner or holder has no intention of developing and utilizing the land, the Commission can step in and acquire and then make such arrangements as it sees fit for proper development use.

The question to be settled in the case of the first type, inheritor-holder, is what amounts to a fair purchase price, all aspects of the matter considered. It is also an important question to answer for the second type, although in this case means of circumvinting all the legal and procedural entanglements possible must also be found.

It is with a third typd of landowner, however, that the Commission is having the greatest number of its problems. This type is usually fully conscious of having unused lands, and either has definite plans for development of such or else is willing to carry out development. There is always a substantial obstacle which he cannot overcome by

himself. The obstacle might be that the holder wants some project, such as an assured and adequate water supply, and this is either non-existent in the area or extremely costly to comy by. Or the owner might personally lack the finances with which to operate, and has no means of obtaining adequate credit. Or again, the land might be highly suitable for the growing of a certain crop or crops but, having regard to the market situation, the holder is afraid to undertake the venture because of the risk involved.

The above three examples outline only the basic cases. For years, the Jamaican farmers have been asking for land reform and now that it is here, there are problems in implementing it. The core of the problem lies in inadequate finance. If a man is willing to develop his lands, but lacks the capital with which to do so, the government ought to be in a position to advise him where he can obtain the necessary money. The government should be able to go even beyond advice and take an active part in helping him to get it. If the government were to transfer his land to others, the chances are that the next owners would also be unable to adequately finance its development.

If water is a limiting factor to make a plan feasible, the problem becomes one of finding the ways and means by which an operator can get the water; whether personally for his property, or as part of a community operation.

If the lands are highly suitable for sugar cane or bananas, and the owner knows this, but is unwilling to venture into either because of the state of the markets, the Commission would find it difficult to explain why, purely for the sake of utilization, he should embark on an enterprise that may only bring him loss and aggravate national crop

crises that are already acute. Or the owner may want to go into the production of pumpkins, melons, negro yams or cabbages and wants to know where he can be assured of fair disposal when his crops come in.

A way out of the dilemna is for the government to designate the groups of crops that the Agricultural Marketing Corporation will buy and help him to produce these crops by giving him expert supervision and providing the necessary credit. If the landowner still shows unwillingness to co-operate after the government assures him that the AMC will market what he produces, then the government should take the land and see to it that the next owner is willing to co-operate.

Regulating the Farm Product Market

Farm products, for various reasons, particularly those relating to the variable supply and cost of production, have a basic difference from that of industrial products. The supply of farm product from year to year, is subject to natural hazards beyond the control of the farmers. This variability of output causes serious fluctuation in the prices as well as costs of production of agricultural products which tends to cause disorder in the agricultural situation. Therefore, one of the compelling necessities of agricultural development, from the economic viewpoint, is the stabilizing of the prices of agricultural products. In Jamaica this is done by the Agricultural Marketing Corporation which guarantees that farmers may receive a higher, but not a lower price than the stated minimum.

The marketing agency should take the necessary measures for the balancing of the supply and demand of agricultural products through adoption of a logical policy. The price of farm products should be

fixed so that (1) continuation of farm production would be maintained; and (2) the living standard and purchasing power of the farmer would be increased, thus resulting in more demand for industrial goods and a rise in the national income.

The stabilization of agricultural production is a vital matter, not only from the internal and national point of view, but also from the international point of view. So far, some measures have been adopted by international groups, but no great success has been achieved. In general, it can be said that the conditions governing the exchange of food supplies and primary raw materials, have been to the benefit of industrial countries.

Agricultural countries, like Jamaica, who are producers of raw material have not fared well, and agricultural countries have been in an unfavorable position in comparison with the industrial countries. As a consequence, the living standards of the first group are lower than that of the second. It can be said that one of the main ways the industrial and wealthy countries can help Jamaica and other developing countries, is in the betterment of the exchange conditions of raw material and agricultural supplies.

If this basic step should ever be taken by the wealthy countries, and the cost of raw material is stabilized, perhpas there would be less need to extend credit, grants, aid, etc., and Jamaica and other developing countries would be able to eliminate their main difficulties themselves.

Unfavorable exchange conditions for Jamaica is one of the reasons industrialization is a necessity. However, the goal of agricultural expansion should not be primarily the increase of production for export,

but products should be produced which have favorable world market exchange conditions or those in which the country has a special advantage in production. Otherwise, investment of capital in industrial or related types of development would be more beneficial.

World market prices of Jamaica's primary exports -- banana, sugar and citrus -- have been steadily declining while the cost of producing them has been steadily increasing. The production of these crops needs mechanization badly. Otherwise, Jamaica will have to yield its share of the market to countries like the Canary Islands and Brazil in future years. The situation is such that Jamaica cannot even seek new markets until the current high cost situation is corrected.

Besides the price problem of agricultural products, the marketing of farm products and their handling require facilities that must be provided between farmers and consumers. To solve this problem, a series of fundamental actions are needed such as construction of suitable roads between producing and consumption centers. Also, co-operation among farmers is required to insure the selling of agricultural products at a profit.

Technical Improvement of Agriculture

Mechanization of agriculture is not possible merely by importing tractors and agricultural equipment. The farmers must be taught how to operate this equipment. In Jamaica, there are a few cases where farmers pool their capital and buy tractors, but face difficulties when it comes to their maintenance. The usual case, however, is for farmers to pool their labor and help each other with their crops, using such crude implements as picks, hoes, and spades. In some areas, this is

the most desirable way of co-operating, since modern equipment cannot be used.

There needs to be a comprehensive scheme to teach farmers how to combat insects and pests. To insure good performance in all these matters, more demonstration farms are needed as well as agricultural exhibitions, vocational training centers, and people who are interested in going to the farmers from day to day to help them solve their problems and to teach them new techniques and how to man modern equipment.

To develop agriculture, it is necessary to create suitable organizations to meet the requirements of the farmers and to secure their participation. The best way to accomplish this objective is to establish co-operatives in the rural towns and extend them throughout the parishes and counties.

Phases of Agricultural Development

As agricultural development proceeds, the production process inevitably goes through a number of phases, in the same way that industrial development goes through a number of phases.[6] The path of development followed depends on the resource structure. This structure differs between countries and, hence, the development path differs. Three stages of agricultural development are here delineated and presented in the order which often is found in a developing agricultural economy. It should be clear, however, that this is neither the order which all agricultural development in the world has followed, nor necessarily the one followed in the past by Jamaica.

---

[6] R. Rostow has delineated five phases for Industrial Development. For agricultural development, most writers delineated only three phases as outlined in this section.

Stage I: Traditional Agriculture[7]

This phase is a technologically stagnant phase in which production is increased largely through slowly increased application of traditional forms of land, labor, and capital. Any expansion that occurs may well be through increased input of the already abundant low productivity resources. Expansion of production in this phase may be accompanied by declining income and productivity per unit.

Features generally regarded as typical of a dynamic agriculture may be introduced in a traditional agriculture, however, when introduced as single changes in practices, their effects on productivity is usually small.

If substantial quantities of capital are drawn from agriculture, rural welfare will almost certainly decline, since withdrawal will be against a relatively stagnant production background. Also, measures to increase production sufficient to meet the requirements of income and population growth are likely to require large amounts of capital for non-agricultural development.

Stage II: Low Capital Technology

This is the stage in which agriculture can play a crucial role in overall development. In this stage, (a) agriculture still represents a large proportion of the total economy, (b) demand for agricultural products is rising rapidly due to both demographic and income effects,

---

[7]See Thorbecke, Erick, The Role and Function of Agricultural Development in National Economic Growth, printed in Economic Development of Agriculture, Iowa State University Press, Ames, Iowa, 1965, p. 278.

(c) capital for industrial development is scarce and returns are rising, (d) limitation to the pace of the economic transformation and pressure of population growth preclude enlargement of the average acreage per farm, and (e) use of labor-saving agricultural machinery is largely precluded by unfavorable labor-capital cost relationship. These conditions call for a type of agricultural development which at one time was not possible, but which is now facilitated by modern science.

In this stage, technological changes substantially increase the efficiency of the agricultural process and raise the rate of increase of agricultural production. At the beginning of this stage, production increase is likely to be achieved through spreading acceptance of a small number of technological improvements, perhaps even in a limited number of geographic areas, which individually give a large increase in production even in the face of imperfections in the land tenure and marketing systems and credit facilities.

With continuing advance in this stage, further expansion will be based, to a greater extent, on a large number of changes which individually give considerably smaller response, but which collectively add up to a large response. For these individual innovations to be accepted, incentives and various servicing agencies must be improved. Also, research and extension organizations need further refinement of operation. Agricultural development in Stage II is a dynamic process providing a continuing rate of increase. It is not just a process of introducing a given set of innovations and reaping a once-and-for-all benefit. It is a stage in which a stream of innovations is generated by the process itself.

The emphasis in this phase is on increasing yields per acre of crops and output per livestock unit. This occurs in part through the

use of innovations which are directly yield increasing or by increasing efficiency in the use of non-land resources. Technology may save labor which can be re-applied to produce more intensive cropping patterns.

The critical characteristic of Stage II, as compared with Stage I, is the constant generation and application of technology which is facilitated by a complex institutional framework. The critical characteristic of Stage II, as compared with Stage III, is that the use of capital is very sparing and is not substituted for labor unless the labor can be put back into the production process in such a manner as to achieve an increase in production.

Stage III: High Capital Technology

The key characteristic of the stage is the substitution of capital in the form of large-scale machinery for labor. This tends to be a technologically dynamic stage in that institutions are developed which create a stream of labor-saving mechanical innovations and facilities for producing, distributing and servicing such machines, so that a continuum of increasing labor productivity is created.

This stage normally occurs after the process of economic development has been under way for some time. At this point, the agricultural sector has diminished significantly in relative importance, capital formation is sufficient to permit rapid expansion of the non-farm sector to allow gradual intensification of capital use in agriculture. As a result of the expansion of the non-farm sector, the man-land ratio is falling and average size of farm is increasing.

In this phase, agriculture needs capital to purchase land as farms are enlarged and to finance the machinery and working capital for

handling larger farms. At the same time, there is an increasing trend for farmers to use various urban-produced inputs in addition to machinery. At this stage, the economic transformation has generally proceeded to the point at which agriculture occupies a smaller position in the total economy and does not bear the heavy burden of financing the development of other sectors.

Jamaica's Stage

It is not necessary that a country go through all these stages. Some nations have gone from the traditional to the high capital technology stage by emphasizing technology which uses large amounts of capital for the purpose of displacing agricultural labor with later introduction of a technology which is also yield increasing.

When we compare the agricultural situation of Jamaica with the three stages outlined, we readily fit Jamaica in early Stage II. Jamaica is unavoidably characterized as one of "low capital technology". Although in the past, agriculture has not played a crucial role in the overall development of Jamaica, it can play a crucial role as it progresses towards Stage III.

In Jamaica today, agriculture still represents a large proportion of the total economy. Demand for agricultural products is rising rapidly due to both demographic and income effect. This poses a problem to the government, especially since production has been decreasing, but at a slower rate than the rise of importation. What is needed at this stage of the agricultural development program is a complex of technological changes to increase the efficiency of the agricultural development process and to raise the rate of increase of agricultural production.

There is, moreover, a great need to coordinate agricultural and industrial development in Jamaica. For the past ten years, the accent has been on industrial development with little emphasis on agriculture. Now there is sudden awareness that development of both agriculture and industry are required for economic development.

Discussion on the subject of whether Jamaica should be an industrial or agricultural country is useless and misleading. In the first place, Jamaica does not have the resources to create a strong industrial base, and secondly, it is already an agricultural country with a good agricultural base. However, parallel to any agricultural improvement there should be industrial advancement. If only new industries are pushed and agricultural improvements are ignored, there will be no internal market for industrial products.

Unfortunately, there has not been such a co-ordinated effort in Jamaica. The great industrial push that has been carried out for the last ten years has left the economy in an unbalanced state. However, one change, whether good or bad, did come out of this push and that is it caused both the farm population and the farm labor to decline. The constant publication that another factory is being built in Kingston has the effect of causing rural people to migrate to Kingston, but when their expectations were not met, instead of returning to the rural areas, these people remain in Kingston and aggravate the slum and the unemployment situations.

The agricultural investment objectives which should be adopted in order to bring about some kind of coordination and necessary results are:

1. providing for the food requirement taking into consideration the population increase and consumption needs;
2. furnishing raw materials for the needs of factories which process agricultural products, both present and potential;
3. increasing agricultural productivity, which will lead to increasing the farmer's income and his purchasing power, and increase his consumption of industrial products.
4. furnishing products for export especially those products which are competitive on the world market.
5. promoting industries designed to provide the agricultural needs of farmers, such as chemical fertilizers, irrigation means, material for disease and pest control, electric power, etc.

Undoubtedly, the investment in agriculture and industry should be balanced. The ratio should be such as to provide for the realization of the economic development goals.

As agriculture becomes mechanized and industrial development progresses, both agricultural and industrial output should increase substantially. And as both progress, an appraisal of public expenditures and inducements should be made between types of crops and areas. A similar type of appraisal should be for types of industries.

In proportioning investments, it is the relative amount by types and purpose that should be estimated in arriving at the total investment desired in agriculture and industry.

CHAPTER VI

THE ROLE OF AGRICULTURE IN THE ECONOMIC DEVELOPMENT

Introduction

Economic development necessitates the general transformation of an essentially rural economy, with the great bulk of the rural population employed in agriculture, into an integrated economy, employing the largest share of the labor force essentially in industries. One of the necessary conditions for economic growth -- and symptom of such growth -- is that the industrial labor force increases at a faster rate than the growth of the total population.

As industrial development proceeds, the basic role of agriculture in generating development is to make labor and, in some instances, capital resources available to the industrial sector. To do this, agriculture should be able to draw on its disguised unemployment and on innovations which will increase agricultural output with a minimum injection of outside capital into the agricultural sector. However, labor can be released by the agricultural sector even in the absence of disguised unemployment.

Increases in output per man-year can be achieved through technological progress in agriculture and whenever feasible, through capital formation within the sector. A number of policy means have been suggested as being appropriate at different stages of agricultural development, as necessary for the increase in the productivity of the existing

resources in agriculture to enable the freeing of resources for use in the industrial sector.

The industrial sector has a supporting role to the agricultural sector, at least at the outset. It must absorb the resources released from agriculture. The industrial sector's absorption of labor is determined by three factors: (a) investment in the industrial sector, (b) the intensity of innovation, and (c) the labor-saving bias of the innovations. Only when the industrial labor force grows more rapidly than the total population does, economic development takes place. The starting point must be an increase in industrial investment which makes it possible to absorb a certain amount of labor.

A scarcity of capital characterizes countries at the early stage of development. Therefore, industrial investment likely will trigger innovational activities which have lain dormant. These innovations can be undertaken more easily at a higher level of output, resulting from the injection of investment, and may lead to further increase in output over and above the rise in output made possible by investment alone. The additional increase in output due to innovational activities would occur exclusively through a more intensive use of labor resources.

As development proceeds, the center or gravity gradually moves away from the agricultural sector to the industrial sector. As long as the industrial labor force increases more rapidly than the total population, the percentage of the total labor force employed in industries will increase as will the percentage of total output representing industrial goods.

In the early stage of development, the most important policy prescription -- apart from the controlling of population growth -- is to

push those new techniques in agriculture which can be adopted at a small capital cost. These techniques should induce increased productivity in agriculture and permit the release of labor resources.

The question that now arises is, "What has been the performance of Jamaica's industrial and agricultural sectors during its brief period of agricultural and industrial growth?" The following section will attempt to answer this question.

The Contribution of Agricultural Development to the Industrial Development

According to Dale E. Hathaway,[1] there are four contributions that agriculture can make to a nation's economic growth. First, it can provide the food and fiber base necessary for a population growing in numbers and in wealth. But it is important that this be done without an increase in the total resources used and/or in the relative price of farm products. Economic growth is stimulated if farm prices decline so that people will have more money to spend on other goods and services. Secondly, agriculture can provide workers to produce other goods and services by releasing them from the production of farm products. Thirdly, agriculture can provide a market for non-farm goods and services, enabling the gainful employment of people in their production. Finally, agriculture can provide a source of capital that may be invested in improved productive facilities in the economy.

---

[1]See Hathaway, Dale E., Problems of Progress in the Agricultural Economy, 1964, pp. 2-7.

Food and Fiber

Agricultural production has not kept pace with the rate of growth of the population. Indeed, production declined during the period under study. Had it not been for rapid increases in food importation, there would have been widespread starvation in the country.

Because of the lag in domestic production and the rise in import, food prices have been rising steeply. Thus, any improvement in the diet of the consumers has been brought about by spending an increasing portion of their income on food. It has been estimated that the greater part of the consumer's income in Jamaica is used for the purchasing of food and the rest for rent, leaving but little for non-farm goods.

Jamaica's output has stagnated because farmers adhere closely to the traditional way of production. The small degree of technological change that has taken place in agriculture has been on the larger commercial farms, but only after stiff resistance by agricultural workers and trade unions. On individual farms almost no technical change has been made from the time of our grandfathers. The reasons for this are complex, but essentially the lack of education and capital plus the rough terrain are the major causes.

In any event, food and fiber have not been contributing factors to Jamaica's economic growth. The only fiber that has been helpful, although only in a small way and to the industrial sector has been cotton. The bulk of the cotton that is being used in the clothing and fabric industries is imported.

Farm output will be increased when there are changes in the mix of resources along with technical and economic changes. What is most urgent at this time are cultural practices which will enable farms to produce

more. There is plenty of labor on farms and the big question is whether or not the industrial sector can expand at a rate that is adequate to overcome the hidden and visible unemployment, plus the new additions to the labor force that even simple labor-saving devices will generate. A quick answer at this time would be that the solution seems to lie in increased emigration.

Labor for the Industrial Sector

Figures from the 1960 Agricultural Census showed that the number of people on farms had shrunk from 900,000 to 740,000 from 1954 to 1961 while at the same time the number of agricultural workers (excluding farm operators) declined from about 262,000 to 165,000. It was estimated earlier that more than 50 percent of the agricultural labor is now redundant.

In some countries, workers may be needed on the farm to maintain or increase farm output, but in Jamaica's case, it would appear that there are too many workers on farms now and they are getting in each others' way resulting in even lower physical returns.

This decline of approximately 100,000 agricultural workers and 160,000 farm people has been beneficial to agriculture, for otherwise the agricultural sector would be in an even worse position today. It cannot be said, however, that the industrial sector has benefited. The reason for this is that during the period that the migration was in progress, the industrial sector was hopelessly overcrowded. Therefore, the impact of the migration to the non-farm sector made life more miserable for the non-farm sector. Migration to England and the U.S. during the period is said to have done much to ease the pressure in the non-farm sector.

Markets for Non-Farm Goods and Services

Because there has not been any significant improvement in agriculture, it has been a poor market for non-farm goods and services. The farm equipment, fertilizers, and chemicals that are being used on the commercial farms were all imported. Recently, a fertilizer plant was established, but it soon proved grossly inadequate and has done nothing to cut down on imports.

One can see how specific industries producing inputs like fertilizer, chemicals, and insecticides might become successful while seeing but little hope in the successful manufacture and sale of farm equipment in Jamaica. Needs in this area will have to be satisfied by imports.

In summary, it is unlikely that the agricultural sector will ever be a significant market for non-farm goods and services and it should not be relied upon to serve this function in economic development.

Capital Formation

Until recently, the export of farm products was the principal source of payment for capital imports from England, U.S., Canada and Japan. Agricultural exports is next to bauxite, the most important source of foreign earnings that contribute to our ability to import foreign goods.

Private capital formation in U.S. agriculture has largely been financed within the industry itself and this great accumulation of capital has made the capital-man ratio in agriculture higher than in the average non-farm industry. It has been achieved largely without drawing upon the capital accumulation of the non-farm economy.

In contrast, the agricultural sector of Jamaica has remained largely backward and unproductive because there has been little capital accumulation in the sector. Whatever little there has been is confined to the commercial farms. However, in Chapter III it was indicated that there is a hidden source of capital in the sector which could be utilized if the farm population could be significantly reduced.

There are too many mouths to be fed on the average farm in Jamaica and whatever source of income there is goes to the feeding of large families. Fewer mouths would certainly mean more fertilizer, more insecticides, more chemicals and more farm equipments.

It would appear useful, therefore, to determine the extent of the hidden source of capital in the agricultural sector of Jamaica and to analyze the implications that result when this source of capital savings is allowed to emerge.

The two main points brought out in earlier chapters are: (1) production had declined for the period under study, and (2) approximately 50 percent of the labor force is redundant. To inquire more precisely into this situation, the use of a modified Fei and Ranis model and analysis is most appropriate.[3] Let the relevant production function be represented in Figure 4. Also, let the factors of production used as inputs be labor (measured on the horizontal axis) and land (fixed in quantity for the figure). Units of physical product are measured on the vertical axis, total physical product of labor (TPP_L) and marginal physical product of labor (MPP_L) are shown for alternative quantities of labor in the figure.

---

[3]See Fei, John C.H., and Gustov Ranis, Development of the Labor Surplus Economy, Homewood, Illinois, Richard D. Irwin, Inc., 1964.

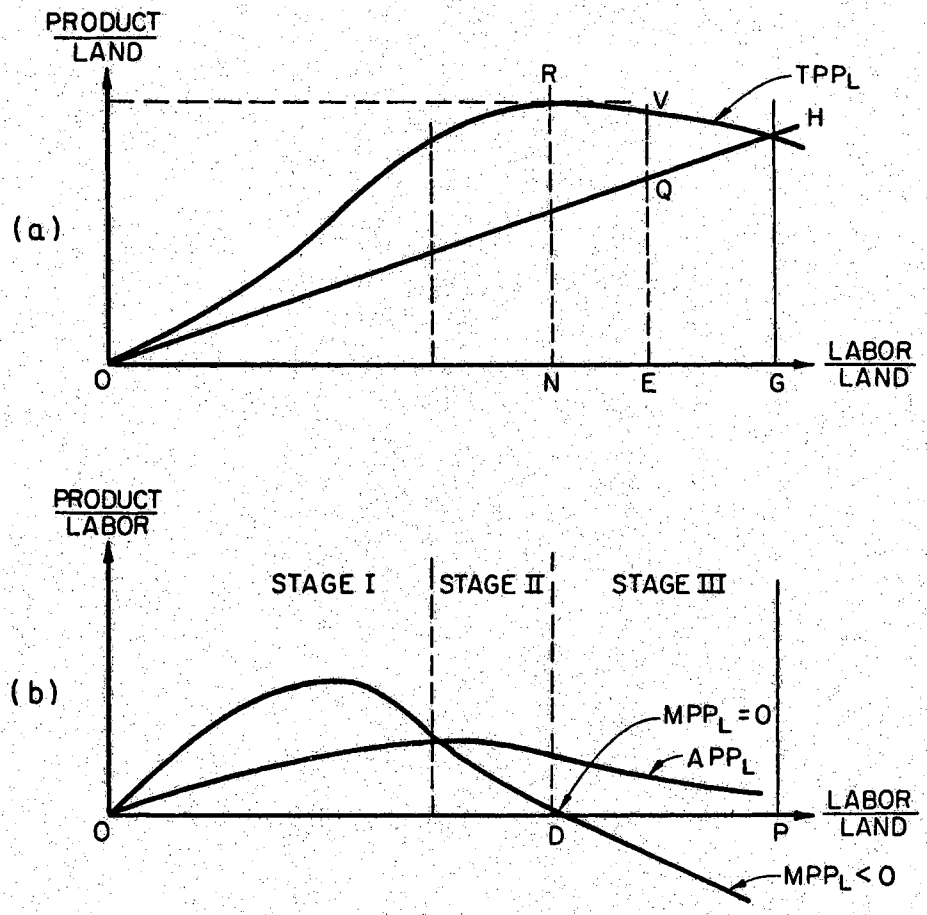

Figure 4. Hypothetical Production Function for Jamaica, 1954 - 1961.

The relationship between TPP_L and MPP_L describes the hypothetical production relationship between the given amount of arable land and a varying amount of agricultural labor. These curves illustrate the "law of diminishing returns" which has been referred to in various chapters of this thesis. They indicate that TPP_L increases at an increasing rate then increases at a decreasing rate, when more and more laborers are added to the fixed amount of land (1,711,430 acres) until at point R, the TPP_L begins to decline.

The consequences of this fixity of land as a limiting factor in economic growth has long been recognized in the growth theories of the classical economists and recently has become a topic of much discussion. This fixity of resource led to the development of the "law of diminishing returns" which states that, if the input of one resource is increased by equal increment (in this case, increment agricultural labor) per unit of time, while the input of another resource is held constant (in this case, 1,711,430 acres of arable land) total output will increase, but beyond some point the resulting output will become smaller and smaller.

An important relationship exists between TPP_L and MPP_L curves. It is that when MPP_L reaches zero the TPP_L curve is at a maximum and TPP_L declines when MPP_L is less than zero. There is an element of disagreement among economists as to whether or when MPP_L is less than zero. It will be recalled that the data show that agricultural output declined for the period.

If we assume that the units of labor which can be productively employed (without becoming redundant) per unit of land at a point in time is ON, we can call it the "efficient labor factor". The point on

the TPP_L curve that represents ON ir R. Suppose the actual existing population density or number of workers per unit of land in the agricultural sector is represented by point OG. If we call this amount "the endowment factor", and designate it by OG then ON < OG and the redundant labor force would then be equal to NG while the productive labor force is ON.

It was this surplus labor force represented by NG that was responsible for the decline in total output (TPP_L) for the period under study. This is the portion of the total labor force that was consuming the agricultural surplus while at the same time was unable to make a positive contribution to it. The problem is how to reallocate this portion into the non-farm sector where it may be able to make a positive contribution. Many writers contend then when this surplus labor is reallocated out of agriculture, a "hidden source of rural savings" emerges along with increasing agricultural production.[4]

This hidden rural savings is in essence a "hidden source of rural capital". After reallocation and after the farm population became substantially reduced with fewer mouths to be fed, the farm operator in Jamaica (as well as in other underdeveloped countires) will be able to either put away this portion of his retained income for savings or use it to buy more fertilizer, pesticides or insecticides or even to purchase the farm equipment he has been doing without.

By the use of the figure, a hypothetical policy and implication for Jamaica can be analyzed. The policy to develop now is what to do

---

[4]See Nurkse, A., Problem of Capital Formation in Underdeveloped Areas, (New York: Oxford University Press, 1953). Lewis, A., "Development with Unlimited Supplies of Labor", The Manchester School, May, 1954.

the surplus portion of the labor force. Let the total agricultural labor force be OG. Let total agricultural production for the period be GH. The average productivity of the total labor force is APP_L = GH/OG, which is the slope of the line OH. Since real wage cannto be determined under conditions where competitive market conditions do not prevail, let us assume that the Government of Jamaica set a minimum or social wage as being equal to the average productivity of labor in agriculture. The social wage would then be indicated by the line OH shown in the diagram Ia.

To shift out a portion of this surplus labor to the non-farm sector and then analyze the impact, let us begin at G and reallocate until we reach point E. At this point, the labor force remaining in agriculture would be OE. The remaining labor force would then be producing an output of EV units while at the given social wage, its income is represented by EQ units. The difference between the agricultural output VE and the income of agricultural labor or EQ, is VQ, which is the excess over the consumption demand of the agricultural labor force remaining on the farms.

Now that a portion of the surplus labor has been shifted off the farms, we can look at the removal as freeing a hidden source of rural savings for use in development efforts of agriculture such as the purchasing of improved seed, or buying of more fertilizer. Or this surplus may be used as investment funds for the development of the industrial sector. So, the allocated agricultural labor EG (trained into industrial labor) and the resulting agricultural surplus VQ (converted into industrial capital) together, represent the contribution that the agricultural sector of Jamaica could make to the industrial sector.

Therefore, by utilizing this surplus labor and the resulting surplus of agricultural products, the agricultural sector of Jamaica can play an important role. For instance, it can be called upon to perform a series of vital functions including the provision of manpower, food, and raw materials as well as providing the savings required to fuel the expansion of the industrial sector. However, the industrial sector must expand in such a fashion as to absorb the minimum number of agricultural workers with the minimum allocation of the economy's scarce savings fund.

Therefore, the pace of economic transformation has important implication to both the role and the strategy of agricultural development. On the one hand, the pace of transformation is the key determinant of the size and rate of change of the agricultural labor force, which in turn affects labor and capital productivity and income in agriculture. On the other hand, the extent and rate of transformation and the specific nature of the agricultural sector determine the extent to which economic development depends on capital formation in agriculture and transfers of capital from agriculture to other sectors.

According to the agricultural census, 1961, their number of small farms (up to 5 acres) was 113,000 of the total of 159,000 farms. The number of workers on these farms were 54,000 of the total of 165,000 or 0.5 per farm. Their number of dependents of these farms was 392,594 or or 3.5 per farm.

If we assume that a farm operator has a farm of five acres and four sons that help him to work it, if there is no expansion of non-farm job opportunities, these four sons will share in the farm -- providing an acre per faimly rather than five. Although the labor of four sons

rather than one will normally give some added production, the limited land resources will provide less than a quadrupling of production with a quadrupling of labor. With the change in generation, the incomes of the sons and their families will be much smaller than that of the previous generation.

However, if the nonfarm employment expands at a rate so that two of the sons are able to leave their farm employment, the man-land ratio on the farm will decline and the farm operator will have a larger income and may be able to use a portion of it to develop the farm. If all of the sons of the family find jobs off the farm, the development of the farms can proceed further.

As reallocation proceeds and approaches point N on the diagram, there will be a tendency for workers to be released at a faster rate than they can be absorbed in the industrial sector. Because the industrial sector has high rates of unemployment, and new factories are becoming more and more capital intensive, there will be a need for training part of this released labor force in the use of industrial skills. At the outset, skilled personnel are required for some projects involved in the initial development program and it may be necessary to train personnel at various levels -- from manual workers to engineers. As development proceeds and the structure of production is transformed, there will be an increase in the number of economically displaced when the released agricultural labor fed by the agricultural surplus is enabled to create new output in the non-farm sector.

Based on the above analysis, it is reasonable to say that the agricultural sector has contributed only in a small way to the economic development of Jamaica. Indeed, the industrial sector, which began its

development in the 1950's with the discovery of bauxite, developed independently of the agricultural sector. This sector was financed mainly by foreign capital and relied entirely on foreign inputs for production.

The agricultural workers which were intended to work in the industiral sector were never absorbed by that sector. Industrial factories are capital-intensive and require mostly skilled workers, thus, the agricultural workers' chances of finding jobs in the sector is slight. For instance, for the period 1960-68, the number of approved enterprises that were established in Jamaica were 181 and valued at $75,000,000, offered employment to a total work force of 12,000 workers. At the same time, the unemployment rate is estimated to be between 20-30 percent of a work force of about 800,000. The percentage decline of the number of workers from farms was 37 percent for the period 1954-61, representing a total of 100,000 workers. If we assume that the rate for the period 1960-68 was 20 percent, this amount together with a 30 percent unemployment rate has certainly caused further deterioration in urban areas.

There is no doubt that the agricultural sector can be made to play a key role in the future. What is badly needed at this time is positive government action to stimulate the section in order to get agriculture moving and, thus, making the necessary contributions to the economy.

Because of the limited employment situation in the industrial sector, there is a limit to the absorption of even trained workers. Since agricultural workers are agriculturally inclined, a portion of this reallocated labor would be trained in the production of new crops. In view of the fact that only 32 percent of the farm land is cultivated new land should be brought into production with the aid of the government.

A portion of the surplus workers could be used for the development of Pedro Plains, the lands around Black River, and the reclamation of the lands around the Martha Brae Swamp. All these lands can be used to produce most of the protein products that are so heavily imported.

From the above analysis, the clear implication is that the agricultural sector in Jamaica is capable of providing simultaneously the manpower and the accompanying capital required for production activities in the non-farm sector. Or the real resource function of the agricultural sector is performed when the released agricultural labor fed by the agricultural surplus is enabled to create new output in the non-farm sector. Some of the things that should be done are: (1) the government should find some positive means of controlling the population growth, (2) government direction is needed to promote external economics and, more generally "balanced growth", (3) government enterprise is justified into activities in which, even though they might be performed by private enterprise, the results of private performance would be less satisfactory than those of government performance, and (4) government enterprises are needed in those fields where profits are too low or the risks are too large to attract private enterprises.

CHAPTER VII

PROJECTED LEVELS OF DEMAND AND SUPPLY OF KEY AGRICULTURAL PRODUCTS TO 1975*

Introduction

While a well devised plan is an absolute necessity to economic development, there is no simple formula for making a development plan. In the first place, a plan is essentially a set of guesses about the future since the assignment of priorities requires estimates of likely results, benefits and costs. Secondly, there is no formula for accurately predicting the future. The best we can do is to seek parallel plans in the past. Development economics compares past and present in search of guidelines for the future. The projections in this chapter are presented as an aid to those responsible for preparing a plan of action and to help them analyze the implications developed in Chapter VIII.

The major objective of this is to obtain a rational projection of Jamaica's supply and demand for specified agricultural products, including rice, wheat and flour, corn, sugar, vegetables, including Irish potatoes, citrus fruits, bananas, meat, including poultry, eggs, dairy

---

*Data presented in this Chapter are essentially abstractions of the work done by the Economic Research Service of the USDA (ERS -- Foreign 148 and 94) Washington, D.C. for the West Indian Islands (British). However, some changes have been made in various parts.

products, fats and oils, coffee, cocoa, tobacco, and cotton for 1970 and 1975.

Demand Projection

Population

The population census of Jamaica was taken on the 4th of January, 1943 and estimated to be 1,246,220. It was taken again on the 7th of April, 1960, and estimated to be 1,624,400.

If we assume that population increased by a constant rate during the 17 year period, then one can derive the annual growth rate by using the natural exponential function of the form $Y = ae^{tr}$, where a is a constant, e = 2.71828, the base of the natural log, t = 17, the number of inter-censal years and r = the annual compounded rate of growth.

Substituting to find the compounded rate of growth (r), we have

$$Y = ae^{tr}$$

$$1{,}246{,}220e^{17r} = 1{,}624{,}000$$

$$e^{17r} = \frac{1{,}624{,}000}{1{,}246{,}220} = 1.308$$

$$17r = \frac{\log_{10}(1.308)}{\log_{10}(e.2.71828)} = \frac{.1139}{.4343}$$

$$r = \frac{.1139}{(.4343)}\ 17 = \frac{.1139}{7.36} = .01548$$

$$= .01548$$

or about 1.55 percent per year over the inter-censal period from 1943 to 1960. Projecting this annual rate of growth of 1.55 percent results in the population estimates for the years 1970, 1975, and 1980 shown in Table XV.

TABLE XV

PROJECTED AND END-OF-YEAR ESTIMATE OF POPULATION FOR SELECTED YEARS

Year	1.55% Projected	End of Year (Estimate)
1943*	1,246,220	1.246,220
1947	1,325,300	1,340,395
1950	1,387,887	1,417,000
1955	1,498,835	1,563,663
1960*	1,618,797	1,624,000
1962	1,668,869	1,676,000
1963	1,694,736	1,720,000
1964	1,721,005	1,762,000
1965	1,747,680	1,811,000
1966	1,767,786	1,859,000
1967	1,795,188	1,893,000
1968	1,823,013	
1969	1,851,270	
1970	1,879,965	
1975	2,030,455	
1980	2,192,724	

*Census Years

The projection indicates that the population of Jamiaca is expected to reach 2,192,724 in 1980, if an average growth rate of 1.55 percent is attained. The end-of-year estimates in the table are supplied by the Department of Statistics. The difference between the two figures is attributed to two factors, (1) approximation in calculation, and the compounding of the average growth rate, and (2) migration. The main factors which determined the rate of growth of population are (1) the rate of natural increase, and (2) the volume of migration.

Economic Growth, 1950 - 1960

Although economic growth in Jamaica for the 1950-1960 period was phenomenal, the growth rate was due largely to growth in the bauxite industry which may not continue. The Bauxite industry grew from nothing in 1950 to an 8 percent share of the gross domestic product by 1960. However, the Economic Research Service of the U.S. Department of Agriculture indicated that a slowing down of the growth rate would not necessarily be a symptom of decline or instability in the economy. On the contrary, it might be accompanied by a more balanced advance of all sections and the greater diversification of the economy.

The agricultural sector showed a relatively slow rate of growth in both constant and current prices for the period. Agricultural industries' share of the total product fell from 27 percent in 1952 to 13.5 percent in 1959. Within the agricultural sector, sugar and livestock showed the biggest absolute growth, but their relative importance in the economy as a whole still declined.

Method of Projection

To obtain a comprehensive picture of the growth factors and their effects on the economy as a whole, the ERS compiled a series of inter-industry tables, the summary of which is presented in Table XVI. These are respectively the base year 1958 and the projected years 1965, 1970, and 1975. It is assumed in the projection that the price level of 1958 will continue.[1]

In order to arrive at the projected figures, each sector was tackled individually. Past trends were examined. Leading authorities in business marketing boards, mining and sugar companies, and government were interviewed, and information was gathered on investment plans and on their general assessment of the future of these industries. On the basis of all these inquiries, growth rates were estimated for each sector, but these were not necessarily the same annual average growth rate over the whole period 1965-75.

By the use of different growth assumptions, such as what each firm intends to do in the future, different levels of income were reached, but only one set of matrices was projected. Given the actual information, given that there would be no violent changes in industrial structure, and given that there is to be no balance of payments problem or excessive foreign borrowing, ERS indicated that income growth could only change marginally from that predicted.

Gross domestic product, national expenditure, gross national product and national income are derived from the main tables and are presented in Table XVII. Gross national product is used as an income

---

[1]The ERS Report was compiled during the period 1958-61.

TABLE XVI

Jamaica: Summary inter-industry table, 1958 and projections

Sales by—	Purchases by—					
	Production	Savings and investment	Household expenditure	Government	Rest of world	Total
1958	J£1,000					
Production	-	49,850	154,698	5,638	65,015	275,201
Savings and investment	19,334	-	10,603	8,019	13,794	51,750
Household expenditure	152,031	-	-	13,324	4,382	169,737
Government	24,674	-	3,116	-	823	28,613
Rest of world	79,162	1,900	1,320	1,632	-	84,014
Total	275,201	51,750	169,737	28,613	84,014	
1965						
Production	-	66,413	217,184	8,489	98,425	390,511
Savings and investment	28,098	-	15,632	9,561	13,122	66,413
Household expenditure	213,833	-	-	20,667	5,200	239,700
Government	34,788	-	5,062	-	1,152	41,002
Rest of world	113,792	-	1,822	2,285	-	117,899
Total	390,511	66,413	239,700	41,002	117,899	
1970						
Production	-	84,429	276,175	11,585	126,370	498,559
Savings and investment	35,067	-	20,883	14,540	13,939	84,429
Household expenditure	273,298	-	-	25,981	7,500	306,779
Government	46,229	-	7,451	-	1,608	55,288
Rest of world	143,965	-	2,270	3,182	-	149,417
Total	498,559	84,429	306,779	55,288	149,417	
1975						
Production	-	100,362	334,707	13,701	147,415	596,185
Savings and investment	43,392	-	26,107	17,797	13,066	100,362
Household expenditure	329,242	-	-	34,509	9,200	372,951
Government	58,738	-	9,365	-	2,131	70,234
Rest of world	164,813	-	2,772	4,227	-	171,812
Total	596,185	100,362	372,951	70,234	171,812	

Source: ERS. Foreign 94, USDA, Washington, D.C., 1964.

TABLE XVII

Jamaica: Income, expenditure and product, 1950 through 1960

Item	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960
At current prices						J£1,000					
Consumption by persons	67,800	76,880	89,220	97,262	106,569	121,029	131,339	145,842	155,610	169,197	183,174
General government consumption expenditure	6,700	8,810	9,013	10,709	11,331	13,156	16,221	18,032	19,090	21,886	24,865
Gross domestic fixed capital formation	6,930	12,160	13,695	14,150	17,300	21,470	38,783	52,104	47,397	46,072	51,705
Increases in stocks	950	475	849	1,025	1,511	3,119	2,838	5,215	3,459	5,029	3,283
Exports of goods and services	18,600	20,570	24,451	31,444	36,967	40,998	45,908	60,245	61,243	64,433	75,527
Less imports of goods and services	-23,687	-29,003	-33,970	-38,775	-44,257	-52,127	-63,672	-75,037	-73,315	-78,319	-89,135
Total expenditure: Gross domestic product at market prices	77,293	89,892	103,258	115,815	129,421	147,645	171,408	206,401	213,484	228,298	249,419
Less indirect taxes	-7,688	-8,837	-9,048	-9,767	-10,298	-11,763	-13,475	-14,997	-15,704	-17,685	-18,885
Plus subsidies	515	625	752	644	559	529	563	458	930	908	717
Gross domestic product at factor cost	70,120	81,680	94,962	106,692	119,682	136,411	158,496	191,862	198,710	211,521	231,251
Less factor income payments to rest of world	+35	-119	+557	-929	-1,282	-1,971	-4,708	-6,803	-6,491	-7,094	-8,623
Gross national product	70,155	81,561	95,519	105,763	118,400	134,440	153,788	184,059	192,219	204,427	222,628
Less depreciation	-3,900	-4,205	-4,890	-6,767	-8,460	-9,332	-10,555	-14,064	-14,954	-15,797	-17,719
National income	66,255	77,356	90,629	98,996	109,940	125,108	143,233	170,995	177,265	188,630	204,909

Source: ERS, Foreign 94, USDA, Washington, D.C., 1964.

indicator. In the total demand projections, the researchers felt that using gross national product conformed to common international practice and makes international comparisons more valid.

Table XVIII gives the gross domestic product projections of selected products to 1975. It indicates that the rate of growth projected for the agricultural exports averages about 3 percent per annum compounded over the period. Domestic food crops show a small increase, mainly in vegetables. The increase in livestock production is not expected to be as rapid as in the past owing to limitations by import substitution arising in beef, eggs, and poultry.

Since the government will have to play an important part in making agriculture a viable industry, it is interesting to note that the projection indicates that government is expected to grow from 6.6 percent in 1958 to 7.3 percent in 1975 as incomes increase.

The projections shown in Table XIX indicate a real per capita (national income) growth rate over the whole economy of 3.7 percent per annum, 1958-65; 3.5 percent per annum, 1965-70; and 2.8 percent per annum, 1970-75. This has the important policy implications for agriculture.

Demand and Income

Given the expected growth in population and in income per capita, the estimation of future demand depends primarily on the relation assumed to exist between demand and income. This is normally expressed in terms of the income elasticity of demand for the different products under consideration.

The statistical measurement of these income elasticities may be carried out by one, or both, of two different methods. Time-series

TABLE XVIII*

JAMAICA: GROSS DOMESTIC PRODUCT OF SELECTED PRODUCTS BY INDUSTRIAL ORIGIN, 1958 AND PROJECTIONS

	1958		1965		1970		1975	
	Million BWI$	%	Million BWI$	%	Million BWI$	%	Million BWI$	%
Sugar cane growing (including manufacturing of sugar)	10.4	5.2	14.2	5.0	17.2	4.8	19.4	4.4
Export Agriculture	6.6	3.3	9.3	3.3	10.3	2.9	11.3	2.6
Domestic Agriculture	10.0	5.0	11.5	4.0	12.3	3.4	12.9	3.0
Livestock and fishing	5.6	2.8	7.7	2.7	8.9	2.5	10.2	2.3
Mining and Quarrying	17.5	8.8	25.8	9.1	35.1	9.7	42.1	9.6
Distribution	31.9	16.1	44.6	15.6	54.9	15.2	77.2	17.7
Transport, etc.	11.9	5.9	17.3	6.1	20.9	5.8	29.0	6.6
Services	37.4	19.8	59.9	21.0	83.2	23.0	93.6	21.5
Government	13.1	6.6	19.3	6.8	26.7	7.4	32.1	7.3

Source: ERS, Foreign 94, USDA, Washington, D.C., 1964.

*Note: Figures in this table are based on 1956 prices.

TABLE XIX

Jamaica: Income, expenditure and product, 1958 and projections

Item	1958		1965		1970		1975	
	J£1,000	J£per capita	J£1,000	J£per capita	J£1,000	J£per capita	J£1,000	J£per capita
At 1958 prices								
Consumption by persons	155,610	100	215,869	124	274,720	146	325,761	160
General government consumption expenditure	19,090	12	28,121	16	38,546	20	49,337	24
Gross domestic fixed capital formation	47,397	30	58,900	34	79,212	42	93,530	46
Increases in stocks	3,459	2	4,513	3	5,217	3	6,832	3
Exports of goods and services	61,243	39	103,425	59	126,370	67	151,415	74
Less imports of goods and services	-73,315	-47	-107,331	-62	-136,960	-73	-158,080	-77
Total expenditure: gross domestic product at market prices	213,484	137	303,497	174	387,105	205	468,795	230
Less indirect taxes	-15,704	-10	-20,250	-12	-27,521	-15	-33,109	-16
Plus subsidies	930	—	1,121	—	1,250	1	1,400	—
Gross domestic product at factor cost	198,710	127	284,368	163	360,834	191	437,086	214
Less factor income payments to rest of world	-6,491	-4	-11,302	-7	-12,459	-7	-13,732	-7
Gross national product	192,219	123	273,066	173	348,375	184	423,354	207
Less depreciation	-14,954	-10	-23,150	-13	-29,588	-15	-36,715	-18
National income	177,265	113	249,916	143	318,787	169	386,639	189
Population . . . . Number	1,563,100		1,744,548		1,886,683		2,040,398	

data relating to income and consumption per capita and to changes in prices over a suitable period may be used to estimate both income and price elasticities. Alternatively, survey data relating to consumption or expenditure by different groups of households in a given period may be analyzed to show the relation between total household income or expenditure and the demand for individual items. A single survey, however, will not permit the estimation of price elasticities, since the price situation must normally be assumed to be the same for all the households taking part in it.

The study by the Economic Research Service (ERS Foreign 148) placed reliance mainly on the second or cross-sectional method, since satisfactory time-series data for a sufficient number of years are not available. Whenever possible, however, the changes which have taken place in recent years in average consumption levels (some of which are of substantial magnitude) have been taken into account in determining the elasticity to be found for purpose of projection.

In Jamaica's case, the survey was carried out by the government Department of Statistics, and a report based on it was issued in 1960. It covered 1,160 households divided roughly according to the distribution of total population between the main urban area, Kingston, the other main towns of the island, and the rural areas.

An itemized food budget, including both purchased foods and those obtained as gifts or domestic production, was requested from each participating household for two weeks at different periods of the year. Information was also sought on other principal categories of expenditure during the year, and on the earnings of members of the household. Because of the difficulties of obtaining reliable estimates of household

income, the analysis of demand elasticities has been based on the recorded total expenditure of the household as the determining or independent variable.

To carry out the analysis, households from the rural areas and from Kingston were first grouped into a series of household types of constant composition in order to eliminate the influence of variations in size and numbers of children on the expenditure pattern. The records for each of the most numerous of these groups were then analyzed by fitting for each of the major commodity groups a semi-logarithmetic equation of the form $Y = a + b \log x$ where x represents total households expenditure and Y the expenditure on the particular product group under investigation. The income elasticity of demand represented mathematically by $\frac{x}{y}\frac{dy}{dx}$, is equal in this formulation to $\frac{b}{y}$, the average value of y being taken in order to give the average elasticity for each sample.[2] By this procedure, a number of estimates of the elasticity for each product-group are obtained. These may, in appropriate cases, be combined by suitable methods of averaging to give an overall estimate of elasticity for the whole population.

In the above formulation, the elasticity is assumed to diminish as the income or consumption level rises, and according to the researchers, this seems in general a more satisfactory assumption than the hypothesis of a constant income elasticity, especially in projecting demand from a base period in which the initial elasticity is high, as it is for many commodities in Jamaica. The semi-logarithmic equation is not the only

---

[2] In practical computation using common logarithms b must be multiplied by $\log_{10}$ (.43429) to obtain the estimate of elasticity.

type which satisfies an assumption of this kind, but it has the merit of being readily calculated and simple to apply for purposes of projection.

Food Expenditure in Jamaica in 1958: Survey Results

The detail of the expenditure on food recorded in the Jamaica survey are summarized in Table XX. Certain features of the food expenditure pattern as revealed by these figures is the large difference in average expenditure between the urban and rural groups of households. Kingston families spent about two and one-half times as much food per capita as the rural families, and on fresh meat and fish and milk products and eggs their rate of expenditure was about three times that of the rural families.

A part of this very large difference is explained by the variation in household size and composition, the rural families being much larger and including a much larger proportion of children than the urban households.

A further part of the total difference is explained by differences in price levels between the two areas, Kingston prices being generally higher, though the price records on which this statement is based show that there are the same products, especially imported items, which are at times cheaper in Kingston than elsewhere on the island. The difference in prices amounted to perhaps 20-30 percent for fresh meat and fish and possibly to somewhat more for fresh fruit and vegetables.

Fresh milk was substantially more costly in Kingston than elsewhere and there was a similar though smaller difference in the price of eggs. Many food, however, were (and are) subject in Jamaica to official price

TABLE XX

AVERAGE FOOD EXPENDITURE PER PERSON, PER WEEK, JAMAICAN EXPENDITURE SURVEY, 1958

Item	Kingston	Other Towns	Rural	Total or Weighted Average
Number of households	352	127	681	1,160
Number of persons	1,138	506	3,209	4,853
Persons per household	3.23	3.98	4.71	4.18
		-- Dollars --		
Fresh meat	.34	.25	.12	.18
Tinned and pickled meat	.11	.04	.02	.05
Fresh fish	.12	.08	.02	.05
Tinned and pickled fish	.07	.05	.05	.06
Roots and starchy vegetables	.23	.24	.22	.23
Other fresh vegetables	-12	.06	.04	.06
Fresh fruits	.10	.05	.04	.05
Tinned and dried fruits and vegetables	.07	.05	.04	.05
Milk products and eggs	.31	.22	.10	.16
Oil and fats (excluding butter)	.09	.08	.05	.06
Cereals and bakery products	.38	.25	.17	.22
Sugar, sweets, etc.	.09	.07	.05	.07
Non-alcoholic drinks	.16	.13	.05	.09
Meals away from home	.41	.12	.03	.13
TOTAL	2.69	1.68	1.02	1.45

Source: ERS, Foreign 148, USDA, Washington, D.C., 1966.

control orders, and these (which include condensed milk, butter and cheese) are practically always sold at uniform prices throughout the island.

Income Elasticities of Demand in Jamaica

Table XXI summarizes estimates of income elasticities for the principle food groups based on the Jamaican survey. The regression coefficients from which the elasticities are calculated are not presented here.

The averages have been derived from the survey figures after making the adjustments, in order to reach estimates, can be taken as applicable to the population as a whole. The researchers explained that in using these figures as the basis of estimated elasticities for projection, it is desirable to consider them in relation to the changes in average income and consumption levels in Jamaica which have taken place during the last decade.

The survey evidence has been used as the basis for estimating the income elasticities for each of the different product groups. But in projecting the demand for individual products, separate estimates of the elasticity for the individual products falling within each group are normally necessary. For instance, the income elasticity for most kinds of fresh meat is put at 1.10 while poultry is given the higher elasticity of 1.50, and a much lower figure (0.10) is assigned to salt meat. Within the cereal group similarly a lower elasticity has been assumed for rice and corn meal than for wheat flour and its products.

The formula employed in making this projection on the basis of the elasticities thus establishes assumes the continuance during the period

TABLE XXI

Jamaica: Elasticities of demand, consumption, calorie content and total demand, for specified foods, 1958 and projections

	Elasticity	Consumption, pounds per year per capita				Calories, per day per capita				Total demand, 1,000 pounds			
	1958	1958	1965	1970	1975	1958	1965	1970	1975	1958	1965	1970	1975
Cereals:													
Rice	.45	42.262	46.738	49.911	52.067	187.400	207.260	221.319	230.877	66,060	81,536	94,166	106,237
Flour	.50	110.671	123.722	132.916	139.113	482.000	538.876	578.882	605.874	172,990	215,838	250,770	283,846
Wheat	.25	1.080	1.146	1.189	1.219	4.540	4.810	4.999	5.126	1,688	1,999	2,243	2,487
Corn and meal	.30	17.703	18.960	19.845	20.429	65.960	70.640	73.941	76.118	27,672	33,077	37,441	41,683
Others	.25	5.820	6.173	6.408	6.571	26.200	27.750	28.846	29.580	9,097	10,769	12,090	13,407
Sugar and preparations	.40	83.466	91.337	96.904	100.660	362.900	397.020	421.327	437.657	130,466	159,342	182,827	205,386
Roots and starchy vegetables:													
Irish potato	.70	12.676	14.771	16.251	17.239	11.000	12.810	14.102	14.960	19,814	25,769	30,660	35,174
Sweet potato	.70	14.749	17.174	18.908	20.059	17.800	20.740	22.820	24.208	23,054	29,961	35,673	40,928
Others	-.10	223.480	218.116	214.541	212.083	215.090	209.928	206.486	204.120	349,322	380,514	404,771	432,734
Vegetables and pulses:													
Tomatoes, fresh and processed	.55	37.258	42.064	45.529	47.802	8.800	9.940	10.754	11.290	58,238	73,383	85,899	97,535
Other vegetables, fresh	.55	23.986	27.080	29.311	30.774	6.636	7.492	8.109	8.514	37,493	47,242	55,301	62,791
Other vegetables, processed	.70	1.499	1.742	1.922	2.039	.410	.480	.526	.558	2,343	3,039	3,626	4,160
Pulses	.55	7.826	8.836	9.563	10.041	32.130	36.275	39.263	41.223	12,233	15,415	18,042	20,488
Fruit:													
Apples, pears and grapes	.66	2.227	2.579	2.822	2.998	.520	.600	.660	.700	3,481	4,499	5,234	6,117
Banana	.65	109.158	125.860	137.759	145.727	90.889	104.795	114.702	121.337	170,625	219,569	258,908	297,341
Citrus – orange and grapefruit	.65	33.047	38.096	41.705	44.118	11.820	13.630	14.917	15.780	51,656	66,460	78,684	90,018
Citrus – lime and tangerine	.66	10.185	11.773	12.897	13.646	2.770	3.200	3.510	3.710	15,920	20,539	24,333	27,843
Coconut	.65	31.151	35.913	39.312	41.587	54.960	63.370	69.359	73.371	48,693	62,652	74,169	84,854
All others	.66	103.043	119.005	130.450	138.080	58.720	67.821	74.336	78.687	161,067	207,610	246,118	281,738
Processed	.70	2.491	2.910	3.193	3.388	8.480	9.880	10.871	11.533	3,894	5,077	6,024	6,913
Meat:													
Beef	1.10	16.380	20.613	23.636	25.651	31.760	39.990	45.830	49.736	25,604	35,960	44,594	52,338
Goat	.50	3.351	3.748	4.025	4.212	5.310	5.940	6.377	6.675	5,238	6,539	7,594	8,594
Mutton	1.10	.661	.838	.954	1.035	1.950	2.460	2.814	3.054	1,033	1,462	1,800	2,112
Pork	1.10	4.255	5.357	6.140	6.663	20.900	26.310	30.159	32.729	6,651	9,346	11,584	13,595
Beef and pork, salted	.10	2.513	2.557	2.614	2.641	17.020	17.420	17.701	17.888	3,928	4,461	4,932	5,339
Processed	1.00	.617	.772	.866	.935	2.990	3.690	4.195	4.530	964	1,347	1,634	1,908
Poultry	1.50	2.447	3.311	3.925	4.336	3.920	5.304	6.288	6.946	3,825	5,777	7,405	8,847
Fish:													
Fresh	.55	14.198	16.027	17.350	18.216	10.940	12.350	13.369	14.036	22,193	27,960	32,734	37,168
Tinned	1.50	3.439	4.652	5.516	6.094	13.440	18.180	21.558	23.816	5,376	8,116	10,407	12,434
Salted	-.05	13.580	13.426	13.308	13.227	30.000	29.610	29.400	29.220	21,227	23,422	25,108	26,988
Others	.55	.944	1.056	1.154	1.211	1.752	1.975	2.141	2.248	1,476	1,842	2,177	2,471
Milk:													
Fresh	.90	29.872	36.200	40.716	43.703	22.270	26.990	30.354	32.581	46,693	63,153	76,818	89,172
Evaporated, etc.	.45	20.194	22.333	23.849	24.879	79.760	88.210	94.197	116.051	31,565	38,961	44,996	50,763
Cheese	.85	1.367	1.631	1.836	1.964	5.830	7.000	7.830	8.378	2,137	2,845	3,464	4,007
Other products	.85	1.367	1.631	1.836	1.964	3.910	4.680	5.251	5.619	2,137	2,845	3,464	4,007
Eggs	1.40	9.325	12.390	14.584	16.048	16.770	22.290	26.228	28.861	14,576	21,615	27,515	32,744
Oils and fats:													
Butter	1.00	2.557	3.153	3.587	3.874	22.700	28.030	31.848	34.391	3,997	5,501	6,768	7,905
Others	.60	15.719	17.945	19.523	20.576	170.320	194.340	211.537	222.949	24,570	31,306	36,834	41,983
Alcoholic drinks:													
Beer	.80	21.098	25.066	27.892	29.790	11.670	13.860	15.428	16.478	32,978	43,729	52,623	60,783
Wine	1.00	.507	.617	.711	.768	.320	.400	.449	.485	792	1,076	1,341	1,567
Others	.10	9.965	10.207	10.364	10.473	30.830	31.570	32.063	32.402	15,576	17,807	19,554	21,369

covered by the projection, of the semi-logarithmic relation between demand and income. On this assumption, the projecting equation is:

$$\frac{Y + \Delta Y}{Y} = 2.3026\beta \log_{10} \frac{X + \Delta X}{X}$$

where β is the income elasticity of demand for each commodity, Y the base period consumption per capita and X the base period income per capita. This equation gives an estimate of average demand per capita of population, from which the aggregate demand is derived by multiplying by the projected relative population for the data in question and by the aggregate supply in the base year, 1958. Table XXII gives the per capita consumption of food. From this table it can be seen that per capita consumption is high for fruits, roots, and starchy vegetables, and cereals.

The approximate average elasticities in terms of calories, weighted in accordance with the estimated calorie values of 1958 consumption per capita, are shown for the major food groups in Table XXIII. As shown by the table, the average income elasticity is 0.45.

Projection of Final Demands

From the data with the elasticities described, and from the data on expected growth of income and population as shown in Table XXIV, the projected final demand to 1975 is shown in Table XXI.

The suitable index for the estimation of demand, has been considered to be the per capita national income. The details of food consumed per capita and its projection is shown in Table XXI. From this table, ERS came to the conclusion that the nutritional value of food consumed in Jamaica compares favorably with other countries having similar income and climatic conditions, etc.

TABLE XXII

ESTIMATED PER CAPITA CONSUMPTION
AND EXPENDITURES, 1958

Item	Kilograms
Food Consumption per capita:	
Cereals, total	80.5
Rice	19.2
Sugar and sugar preparation	37.9
Roots and starchy vegetables (including plantains)	113.9
Vegetables and pulses	32.1
Fruits (including bananas)	130.0
Meat (including poultry)	13.6
Fish	14.6
Milk products (excluding butter)	24.0
Eggs	4.2
Oils and fats (including butter)	8.3
Total	461.1
Calories per day	2,111
Estimated total expenditure per capita on food (in dollars)	$102.30

Source: ERS, Foreign 148, USDA, Washington, D.C., 1966.

TABLE XXIII

ESTIMATED AVERAGE INCOME ELASTICITIES FOR FOOD GROUPS: WEIGHTED ACCORDING TO 1958 CALORIE CONSUMPTION PER CAPITA

Food Groups	Elasticities
Cereals	0.45
Sugar and sugar preparations	0.04
Roots and starchy vegetables	-0.06
Vegetables and pulses	0.55
Fruits	0.65
Meat and poultry	0.09
Fish	0.45
Milk products (excluding butter) and eggs	0.07
Oils and fats	0.65
Average of all above foods	0.45

Source: ERS, Foreign 94, USDA, Washington, D.C., 1964.

TABLE XXIV

GROWTH OF INCOME AND POPULATION (VALUE AT 1958 PRICES)

Items	Unit	1958	1965	1970	1975
National Income	J£*1,000	177,265	249,916	318,787	386,639
Population	Number	1,563,100	1,747,680	1,879,965	2,030,455
National Income per capita	J£	113	143	169	189
Do.	Index	100	126.5	149.6	167.3

Source: ERS, Foreign 94, USDA, Washington, D.C.

*Note: J£ is the symbol used to denote Jamaican pounds.

Supply Projection

The conditions of supply in Jamaica are determined by the basic resource pattern. Both land and capital are limiting factors and this makes the resource pattern somewhat complex. The economy of Jamaica can thus be said to be under the pressure of population on land resources, with consequent pressures to increase industrialization, to increase net output from agriculture, and to increase emigration.

There are known limits to the quantities of land suitable for any one commodity, and acreage can only be increased by substitution. Although increased prices can make possible the cultivation of certain lands not now cultivated, this could only relate to certain commodities and to limited areas. Thus, land must impose early limits in total acreage cultivated.

Table XXV indicates the land use pattern in Jamaica in 1958. Figures from the Agricultural Census, 1961, show that land in farms further declined from the 1958 ERS total. The tabulated figure for 1961 is 1,711,430. It also shows that the number of farms for all size groups declined except the 500+ acres. However, total cultivated land increased. This means a degree of consolidation.

One can measure the population density by relating 1960 population to total land. Population density in terms of total land area per capita is 1.8 or based on land in farms, one gets 1.1 acres per capita (see Table XXV).

The comparisons are of interest because they lead to the question as to what extent the total land used in farming represents the total land area suitable for farming and to what extent the total land area in crops represents the total land suitable for crops. In other words,

TABLE XXV

LAND USE, PER CAPITA LAND USE, 1958, AND PROJECTIONS

Land Use	Base Year 1958	Projections (1,000 acres)		
		1965	1970	1975
Total Land Area (acres)	2,823,040	2,823	2,823	2,823
Population, 1960	1,624,000	1,747	1,879	2,030
Land Area Per Capita (acres)	1.8	1.6	1.5	1.4
Land in Farm (acres)	1,823,000	1,902	1,908	1,905
Land in Farm as a percentage of Total Area	64.6%	67%	68%	68%
Land in Farm Per Capita (acres)	1.1	1.1	1.0	.9
Crop Land	613,000	682	683	685
Crop Land as a percentage of Land in Farm	34%	36%	36%	36%
Crop Land Per Capita (acres)	.4	.4	.4	.4
Permanent Meadows and Pasture	708,300	750	865	900
Improved	90,000	180	280	350
Unimproved	618,300	570	585	555
Forest and Woodland	224,800	220	360	320
Other Agricultural Land	276,900	250	--	--

Source: Compiled from various tables in ERS, Foreign 94, USDA, Washington, D.C.

how much unused land is suitable for farm occupancy and how much land not now under crops could be used for crops?

In an area where land has been the main limiting factor, one would expect to find a fairly economic use of this resource. However, this is not the case in Jamaica and there is little doubt that some expansion could take place. Nevertheless, it is perfectly evident that such expansion, whether of total farm area or of total crop land must be of a marginal nature as compared with current totals.

Figures in Table XXV indicate that a sizeable part of the land area is not farmed. Some of the reasons for this fairly low use is the rugged nature of the terrain, low soil quality, poor drainage and inaccessible roads.

Projected Land Use Pattern

Table XXV shows the land cultivation pattern as observed in 1958, when ERS did their research. These areas have been projected on the following assumptions:

1. The total acreage of crop land is derived from aggregating the average projections made for the individual crops;
2. The acreage under pasture is derived also in relation to projections of livestock numbers, although only for improved pasture can these be considered a fairly exact relationship.

Because of migration marginal lands went out of production between 1954-1961, and it is not predicted that there will be much increase, if any, in total land in farms between 1965 and 1975. However, it is predicted that there will be some increase in the ratio of pasture to

woodland and an even bigger increase in the proportion of pasture that is improved.

Future increases in production can come from a better utilization of land rather than bringing more land into cultivation. However, there are a number of problems likely to be encountered. Land tenure problems are among the many problems inhibiting proper land use. Some of the better uncultivated lands are owned by estates or by small owners who do not utilize them. A scientific approach to the land use problem would advocate intensifying production and possibly reducing the actual area of crop land.

Table XXVI shows past and projected cropland utilization in Jamaica. The aggregation of land under the various crops is greater than the total crop land. This is due mainly to the extensive inter-cropping of coffee, cocoa, bananas, coconuts and, more particularly, among roots and vegetables and fruits mainly consumed domestically. The main sources and assumptions on which the figures for this table are based are discussed in turn.

For sugar, the main sources of data are the British West Indies Sugar Association and the Sugar Manufactueres Association. Also, information from the Agricultural Department.

Estimates of future sugar cane production are made from the trend shown in acreage reaped. The trend since 1940 and the trend since 1950, which is less steep, is taken into account. Table XXVII gives both the production pattern on acreage reaped and the projection.

For rice, no expansion is seen as indicated in Table XXVIII. This means that if the trend is not reversed, either by producers or by government, consumers' needs will have to be satisfied by imports.

TABLE XXVI

TOTAL ACREAGE OF MAIN CROPS, 1958 AND PROJECTIONS

Crop	1958	1965	1970	1975
		-- 1,000 acres --		
Sugar	153.1	160.7	165.6	167.2
Bananas	140.0	169.4	181.8	183.7
Coffee	35.0	32.0	35.0	38.0
Coconuts	94.0	103.2	98.2	103.1
Citrus	45.0	75.0	80.2	90.0
Roots	100.0	90.0	85.0	75.0
Vegetables	32.6	33.0	36.0	40.0
Pulses	43.5	40.0	35.0	30.0
Rice	10.0	6.0	6.0	6.0
Other trees and spices	49.0	46.7	46.2	45.6
Tobacco	2.0	3.3	3.8	4.4
TOTAL CROPS	754.3	828.3	851.0	856.0
Allowance for inter-cropping	-141.3	-146.7	-167.8	-170.7
CROP LAND	613.0	681.6	683.2	685.3

Source: ERS, Foreign 148, USDA, Washington, D.C., 1966.

TABLE XXVII

SUGAR CANE: PRODUCTION PATTERN

Year	Acreage Reaped	Yield Per Acre	Production (tons)
1940	44,484	21.9	99,283
1941	53,319	29.8	155,553
1942	63,322	24.9	155,553
1943	64,910	24.3	165,669
1944	65,196	25.5	155,882
1945	61,154	26.9	152,225
1946	61,827	31.6	177,886
1947	66,214	29.7	170,255
1948	72,427	31.1	192,814
1949	79,518	32.6	237,744
1950	90,778	23.6	271,582
1951	96,518	21.6	267,928
1952	121,762	20.3	265,871
1953	136,430	23.0	330,237
1954	153,671	22.8	363,303
1955	150,413	23.7	396,551
1956	139,438	23.1	356,309
1957	143,787	23.6	359,067
1958	152,568	21.5	332,975
1959	174,857	21.9	378,226
1960	186,787	23.2	418,200

SUGAR CANE HARVESTED AND SUGAR PRODUCTION, 1958, AND PROJECTION

Year	Area Harvested	Yield	Production
	-- Metric Tons --		
1958	152,568	21.54	332,975
1965	152,704	25.40	408,739
1970	157,286	30.48	505,204
1975	158,858	35.56	594,957

Source: ERS, Foreign 94 and 148, USDA, Washington, D.C., 1964.

TABLE XXVIII

RICE: ACREAGE, YIELD, AND PRODUCTION OF ROUGH RICE, AND MILLED RICE PRODUCTION, 1956-60

Year	Acres	Rough Rice Production (tons)	Yield Per Acre (tons)	Milled Rice Production (tons)
1950	5,000	5,000	1.000	3,000
1951	5,432	5,167	.957	3,100
1952	6,500	6,500	1.000	3,900
1953	10,000	11,000	1.100	6,600
1954	12,800	15,000	1.016	7,800
1955	20,800	20,000	1.000	12,000
1956	18.000	16,667	.926	10,000
1957	10,000	9,167	.917	5,500
1958	10,600	9,667	.912	5,800
1959	10,500	9,333	.889	5,600
1960	4,000	3,333	.883	8,000

RICE PRODUCTION, 1958 AND PROJECTION THROUGH 1975

Year	Area Harvested	Production (rough)	Yield Per Acre	Milling Rate	Production
	Acres	-- Metric Ton --		Percent	
1958	10,600	9,667	.91	60.0	5,800
1965	6,000	5,988	1.00	60.0	3,536
1970	6,000	6,258	1.04	60.0	3,696
1975	6,000	6,395	1.07	60.0	3,776

Source: ERS, Foreign 94 and 148, USDA, Washington, D.C., 1964.

Import data at hand shows that there has been a steady increase in the importation of rice. This table gives both the production pattern, and the projection.

For bananas, lack of suitable land for production as well as labor are seen as possible limits to acreage expansion. The problem is reduced fertility, particularly on slopes where the natural vegetation has been removed and erosion has been permitted. Table XXIX gives both past scale of production and projections.

ERS reported that in ascertaining the scale of production for coffee, it encountered many problems of estimation, because many of the coffee trees are grown in scattered plantings and cannot easily be enumerated. Thus the figures given in Table XXX are based on acreage equivalents which gives tree population only.

Estimation of Total Locally Produced Commodities

It should be emphasized that the supply projections were drawn up independently of the demand projections, although in the case of subsistence consumption, reconciliation had to be made at an early phase.

In the previous section final supply tables were presented for the most important products. Also, explanations were given on how the final supply was projected. For tree crops, data on past production is extremely scant. For sugar, final supply was given (see Table XXVII). Final projection of rough rice and milled rice are shown in Table XXVIII. Total production figures for bananas for a past period are not very reliable but were shown in Table XXIX.

For livestock products (see Table XXXI), the base year estimates depended on assessments made of supplies coming forward rather than on

TABLE XXIX

BANANA: ACREAGE, 1942 THROUGH 1960

Year	Acres
1942	55,000
1951	85,000
1952	95,000
1953	115,300
1954	156,250
1955	N.A.
1956	N.A.
1957	
1958	140,000
1959	N.A.
1960	155,400

BANANA PRODUCTION, 1958 AND PROJECTIONS THROUGH 1975

Year	Area Harvested	Yield Per Acre	Projection
	Acres	-- Metric Tons --	
1958	140,000	1.50	210,000
1965	169,386	1.49	251,744
1970	181,818	1.49	270,794
1975	183,682	1.49	273,516

Source: ERS, Foreign 94 and 148, USDA, Washington, D.C., 1964.

assessments of numbers and yields. For milk, the total supplies to households and to the condensery were the basis for the estimation. Data on yields were fragmentary; but, yields on stock numbers were taken into account when projecting future supplies.

TABLE XXX

COFFEE BEAN PRODUCTION, TRADE, AND DEMAND, 1958, AND PROJECTION TO 1975

Year	Area (1,000 acres)	Yield per Acre	Production	Exports and Stocks	Imports	Demand
			-- Metric Tons --			
1958	35.0	.07	2,552	1,300	58	1,310
1965	32.0	.08	2,572	921	--	1,651
1970	35.0	.09	3,125	1,173	--	1,952
1975	38.0	.09	3,237	1,049	--	2,188

Source: ERS, Foreign 148, USDA, Washington, D.C., 1966.

Factors Influencing Yield and Projection: Economic and Farm Organization

Changes in Growers' Price, 1955-60

Figures in Table XXXII give some indications of recent changes in prices paid to growers of sugar cane. These prices vary to some extent with the sucrose content of the cane and also are influenced by the average price per ton of sugar exported, which itself may depend on how much has to be sold outside the negotiated price quota.

TABLE XXXI

LIVESTOCK PRODUCTS: DOMESTIC SUPPLY, 1950, 1955, THROUGH 1960, AND PROJECTIONS (1,000 POUNDS)

Item	1950	1955	1956	1957	1958	1959	1960	1965	1970	1975
Beef	11,727	17,926	19,792	22,344	21,952	32,500	24,800	32,500	39,000	46,000
Fresh Milk	75,000	85,000	83,750	84,750	86,000	110,000	89,243	110,000	110,000	130,000
Eggs	2,700	3,000	4,200	8,475	13,868	19,500	16,500	19,500	24,000	32,744
Poultry Meat	658	1,701	2,000	2,220	2,484	5,600	5,320	5,600	7,500	9.000
Pig Meat	4,250	4,900	5,100	5,760	6,651	9,346	7,300	9,346	11,584	13,595
Goat Meat	7,500	8,000	7,200	6,300	5,238	5,000	5,100	5,000	4,900	4,900
Sheep, Mutton	65	50	64	67	68	70	70	80	98	1,000

Source: ERS, Foreign 94, USDA, Washington, D.C.

TABLE XXXII

PRICES PER TON PAID TO FARMERS FOR SUGAR CANE, 1955 THROUGH 1959, B. W. I. $

1955	1956	1957	1958	1959
12.44	12.78	14.68	13.16	12.66

Source: ERS, Foreign 94, USDA, Washington, D.C., 1964.

Banana producers in Jamaica are paid on the basis of the count, while growers in all other areas of the West Indies are paid on the basis of weight. However, the trend in Jamaica, at present, is to use the weight system. There are seasonal variations in banana prices, but Table XXXIII gives only the average annual prices over the period of 1955-60. Table XXXIV shows price changes for coffee and cocoa which indicates the general trend for these commodities.

Summarizing the price trends in all export crops indicates a slight but general decrease. Rice, which shows a price increase is a crop for which the export market is mainly or wholly a regional one. All other prices reflect the general world situation of falling commodity prices since 1955. Because of established markets and trading agreements, price fluctuations are somewhat less than would be exhibited in the world market over the same period.

The information on growers' prices is fragmentary on the domestic food crops and livestock products. Although movements in retail prices are not exactly the same as movements in grower's prices, the broad

TABLE XXXIII

ANNUAL AVERAGE PRICES OF BANANAS IN JAMAICA, 1955 THROUGH 1960

Year	Jamaica Greenboat J£ per ton	Jamaica Growers Shillings Per Count Bunch
1955	74. 8. 0	9/
1956	73. 1. 0	9/2
1957	77. 3. 0	9/6
1958	74. 1. 0	9/5
1959	68. 3. 9	8/10
1960	66. 2. 10	8/8

Source: ERS, Foreign 94, USDA, Washington, D.C.

TABLE XXXIV

PRICES OF COFFEE AND COCOA, 1954-55 THROUGH 1959-60

Year	Grower's Prices	
	Coffee (price per lb.)	Cocoa (shillings per 100 lb.)
1954/55	2s. 5d	254
1955/56	2s. 5 1/2d	154
1956/57	2s. 6d	129
1957/58	2s. 5d	104
1958/59	2s. 1 3/4d	154
1959/60	1s. 9 1/2d	154

Source: ERS, Foreign 94, USDA, Washington, D.C., 1964.

trend is the same. The retail prices of all foods were about 10 percent lower in the rural areas although Irish potatoes and tomatoes were frequently higher. The retail price index for all food items increased in Jamaica from 100 in December, 1955, to 103.5 in December, 1956; 105.9 in December, 1957; 109.6 in December, 1958; 112 in December, 1959; and 122 in December, 1960. Table XXXV shows retail prices for selected foodstuffs in Kingston for various periods from 1955 to 1961.

Beef prices show the most marked increase. The price was controlled between 1940 and 1960, although between 1950 and 1960, the controlled price increased from J£ 7. 0. 0 per 100 pounds live weight or 180s. per 100 pounds w.d.c. After decontrol, the price increased to about 240s. per 100 pounds w.d.c.

Supplies were increasing in 1962 and the price appeared to be stabalizing, averaging 48 J pence per pound in the first six months of 1962, which would indicate that a new equilibrium is being established.

TABLE XXXV

RETAIL PRICES FOR SELECTED FOODSTUFFS IN KINGSTON, JAMAICA, FOR SELECTED PERIODS

Commodity	1955 December Average	1959 Annual Average	1960 Annual Average	1961 Annual Average
		-- Pence --		
Roots, yams, lb.	5.17	6.14	6.50	6.92
Sweet potatoes, lb.	4.00	4.62	4.88	5.15
Irish potatoes, lb.	4.75	6.00	6.60	6.00
Pulses, red peas, pt.	31.50	33.75	33.00	33.56
Plantains, each	3.10	5.18	4.90	5.24
Cornmeal, lb.	4.50	4.50	4.50	4.50
Oranges, doz.	12.72	21.55	19.33	25.41
Tomatoes, salad, lb.	13.08	11.20	12.10	12.00
Beef rib roast, lb.	27.00	33.00	33.00	45.33
Mutton, lb.	30.00	41.00	38.00	36.10
Pork, lb.	24.00	31.00	30.00	31.50
Fish, snapper, lb.	26.00	30.00	27.60	29.00

Source: ERS, Foreign 94, USDA, Washington, D.C., 1964.

CHAPTER VIII

POLICY IMPLICATION AND RECOMMENDATIONS

Problem Situation

Essentially there are two agricultural problems in the world; one is over-production and the other is under-production. The former is a characteristic of some developed economies while the latter belongs primarily to under-developed economies. The problems of under-developed countries are relatively high food prices, low farm income, high elasticity of demand, high income elasticity, and low elasticity of supply. These problems are essentially the problem of Jamaica. At the root of all these problems is the nature of the inputs -- land, capital, labor, and management.

In Chapter III, it was concluded that even though there was a substantial amount of migration from agriculture for the period analyzed, there were still too many people remaining on farms.

In Chapter IV, the analysis showed that local and foreign markets are adequate to absorb a substantial increase in agricultural production. Also, it was shown from the data that food imports are increasing in order to supplement the deficiency in agricultural production.

Agricultural development was discussed in Chapter V from the standpoint of its contribution to over-all development in Jamaica. After further analysis, it was concluded in the following chapter that

agriculture has played only a small role in the economic development of Jamaica.

Reconciliation

It is proposed here to reconcile the estimate of demand based on projection of income growth, population growth, and calculated income elasticities of demand, and estimates of supply based on projections of acreage and yields. Estimates are in terms of quantities and it is assumed that the prices remain constant. These projections will be analyzed in order to determine the amount of production or export or import, that is necessary to equate projected demand with projected supply. The summary tables of supply and demand for each commodity are presented below.

Rice

As indicated in Table XXXVI, rice production will not keep pace with population, thus imports are projected to fill the deficiency.

Sugar

Sugar is mainly an export crop, thus the main purpose of Table XXXVII is to show how much will be available for export after local needs are met.

Household consumption includes sugar passing through the condensary and sugar used for manufactured sugar preparations such as confectionery. The manufacturing demand includes sugar mainly utilized by fruit processors, cake manufacturers, and beverage producers.

TABLE XXXVI

RICE: SUPPLY AND DEMAND, 1958 AND PROJECTIONS

Year	Total Production	Household Demand	Feed, Seed, etc.	Stock and Export	Imports
		-- 1,000 pounds* --			
1958	12,992	66,060	650	1,280	54,998
1965	7,921	81,536	396	--	74,011
1970	8,279	94,166	414	--	86,301
1975	8,460	106,237	423	--	98,200

*Long tons shown in Table XXVIII are here converted to pounds, and this applies to all other tables in this chapter.

TABLE XXXVII

SUGAR: SUPPLY AND DEMAND, 1958 AND PROJECTIONS

Year	Total Production	Demand		Stock and Exports	Imports
		Household	Manufacturing		
		-- 1,000 pounds --			
1958	745,864	130,466	6,028	609,917	547
1965	901,098	159,342	6,992	735,431	677
1970	1,113,763	182,827	9,946	921,756	766
1975	1,311,639	205,386	11,212	1,095,902	861

Bananas

Like the sugar industry, the banana industry is geared to the export trade and most bananas above a certain size are made available for export. The supply offered on the local market depends largely on the proportion that is rejected for export. Thus, the greater the number of bananas grown for export, the greater will be the supply offered on the local market (see Table XXXVIII).

TABLE XXXVIII

BANANAS: SUPPLY AND DEMAND, 1958 AND PROJECTIONS

Year	Total Production	Local Demand	Exports	Deficiency
		-- 1,000 pounds --		
1958	469,425	170,625	298,800	0
1965	555,000	219,569	353,920	18,489
1970	597,000	258,908	378,000	20,344
1975	603,000	297,341	374,528	68,869

Citrus

Citrus is primarily produced with an eye toward export, but local demand is strong enough that the amount available for export may be considered more in the nature of surplus after local needs have been met (see Table XXXIX).

TABLE XXXIX

CITRUS: SUPPLY AND DEMAND, 1958 AND PROJECTIONS

Year	Total Production	Local Demand	Exports (fresh fruits equivalents)
	-- 1,000 pounds --		
1958	211,149	67,576	143,573
1965	366,750	86,999	279,751
1970	376,900	103,017	273,883
1975	449,350	117,861	331,489

The figures for export are expressed in fresh fruits equivalents, since gross weights of tinned exported products would be misleading, and data on net weights are not available.

Roots and Starchy Vegetables

Imports are expected to rise steeply over the projected period (see Table XL). The import of root vegetables consists wholly of Irish potatoes. At the time the projection was made, there was evidence that the vegetable acreage was declining while demand was increasing. However, as a result of vigorous efforts by the producers and government in recent years, Jamaica was able to export s small surplus to neighboring islands.

TABLE XL

ROOTS AND STARCHY VEGETABLES: SUPPLY AND DEMAND, 1958 AND PROJECTIONS

Year	Total Production	Household Demand	Exports	Imports
		-- Million pounds --		
1958	379.6	392.2	negligible	12.6
1965	400.0	436.2	--	36.2
1970	400.0	471.1	--	71.1
1975	400.0	508.8	--	108.8

Livestock Products

In recent years, Jamaica has reduced her dependence on overseas beef supplies, thus only "other fresh meat" (goat, mutton, and pork) is projected in Table XLI. Lamb usually is imported, pork is mainly locally produced while goat is wholly locally produced. In considering these meats separately a deficiency arose between the supply of goat and projected demand. Jamaica is self-sufficient in poultry meat.

Milk

Fresh milk cannot be imported, and the deficiencies projected in Table XLII will not be filled by imports. As more fresh milk becomes available locally, it will act as a substitute for processed milk products. In order to supply the needs of the condensary, milk solids must be imported to make up the deficiency in local fresh milk production.

TABLE XLI

OTHER FRESH MEAT: SUPPLY AND DEMAND, 1958 AND PROJECTIONS

Year	Total Production	Household Demand	Export	Imports
		-- 1,000 pounds --		
1958	11,957	12,922	--	965
1965	14,426	17,347	--	2,921
1970	16,582	20,978	--	4,396
1975	18,595	24,301	--	5,706

TABLE XLII

FRESH MILK: SUPPLY AND DEMAND, 1958 AND PROJECTIONS

Year	Total Production	Manufacturing Demand	Household Demand	Deficiency
		-- 1,000 pounds --		
1958	86,000	64,739	46,693	25,432[1]
1965	110,000	84,842	63,153	31,995[1]
1970	120,000	87,661	76,818	54,479
1975	130,000	109,879	89,175	69,051

[1]The condensary imports milk solids to make up for deficiency in local supplies.

Pulses

The data on production shown in Table XLIII indicates only marginal increases in production can be expected and not much is likely to be gained from more intensive methods. The imports necessary to meet the demand for household use and stock feed is shown below.

TABLE XLIII

PULSES:[1] SUPPLY AND DEMAND, 1958 AND PROJECTIONS

Year	Local Production	Household Demand	Stock Feed	Imports
		-- 1,000 pounds --		
1958	8,056	12,233	1,098	5,275
1965	7,000	15,415	1,000	9,415
1970	7,200	18,042	1,200	12,042
1975	7,500	20,488	1,500	14,488

[1]Includes peanuts.

Necessary Remedies and Implication

It is obvious from the imbalances between demand and supply of the various products that there is a serious urgency for improving the productive capacity of the farm sector. Equally obvious is that there will be no improvement except by direct government intervention, which should take the form of stimulation of the various growth agents.

The immediate problem at hand is to devise programs that will shift supply at the same speed at which demand is shifting, and since the private sector has persistently exhibited its inability to meet this requirement, it behooves the government in the interest of consumers, to grapple with the problem. The primary function of government, in virtually all cases, is to provide the pre-conditions for growth in the market economy.

Production Problems

From the point of view of the domestic market, the output of agriculture consists primarily of food materials. Ordinarily, more than four-fifths of all farm produce in Jamaica is destined for human consumption. The remainder consists of raw materials supplied to industries other than those manufacturing food products. The chief industries in this second group are those processing tobacco, cotton, wool, and leather; industries making or using starches and oils; and industries making rum, beer, and distilled spirits. The industrial demand for materials of this kind produced by domestic agriculture depends partly upon the availability of similar materials from abroad and partly upon the competition of substances not of agricultural origin.

The principal domestic products subject to competition from imports are rice, meat and meat preparations, dairy products, Irish potatoes, and tobacco and in the case of two -- potatoes and beef -- domestic output has been strongly influenced by the availability of imported supplies. The competition of non-agricultural products is felt mainly by natural fibers for there can be little doubt that rayon has cut into the demand for cotton and possibly for wool. The problem in Jamaica, at the moment

is how to increase production to the level that will more nearly equate demand with supply and thus cut down on importation. From all indication, production has been low because of the use of inadequate inputs.

Efficient Inputs

A judicious increase in purchased inputs with the aim of increasing the output will more than pay for themselves on most farms. Many of the inputs, such as fertilizers and insecticides, are not fully used because of lack of experience in the area or crop involved, but they have a high marginal productivity per shilling of increased expenses.

Farm production in Jamaica is stagnant. For the period under study, farmers have not increased their investments and operating expenses in order to expand production. It is likely that most did not have the money to increase investments and variable inputs, but whatever the reason, the likelihood remains strong that production is not being pushed to the intensive margin.

There are ready markets for as much as farmers could produce.[1] The problem is to help farmers respond to the favorable price and income relationship by doubling or tripling the use of commercial fertilizer and by increasing other non-land variables. There is strong evidence that increased use of commercial fertilizer can make a great contribution to higher crop yields. The use of more and better pesticides, improved seeds, conservation practices, and other factors also have contributed to higher production per acre. Much more could be done in this respect in Jamaica.

---

[1] In Chapter IV, it was concluded that there is both domestic and export markets for a substantial increase in production.

Recently, scientists in Jamaica found that a number of important fertilizers could be synthesized from garbage. At about the same time, a major oil company announced that it could begin to manufacture fertilizer at an early date. The impact of the increased output of fertilizer should be to decrease its price and reduce the need for fertilizer imports. As fertilizer use increases under the stimulus of lower prices, the supply of most agricultural products will increase.

Implications for Increased Input

The important variables affecting food consumption are the price of food, the size of the population, and the income per person. The effect of increased use of resources is to shift the supply function to the right. Since the demand for many foods and services is elastic, more output can be sold with a less than proportional decrease in price and therefore, revenue will increase because price does not decline by as great a percentage as output is increased.

The projections in Chapter VII, show for example, that the demand with respect to rice is elastic. This means that considerably more can be sold with a modest decrease in price. The demand for food in Jamaica is, therefore, a function of prices as well as of population and income. National income growth likely would have a different impact on agriculture than on the industrial sector because of the differences in the income elasticities of demand.

The per capita income effect on consumer expenditure varies depending on the commodity and the level of incomes. For an underdeveloped country like Jamaica with a large, poor, inadequately fed rural population, food has a high demand elasticity with respect to income.

Because the income elasticity of demand for farm products is high in Jamaica, if consumers get additional income, the amount they will spend for food will increase significantly. However, consumers have been enjoying some growth in productivity and income without an increase in food supplies, thus, the existing situation is one of shortages, rising food prices, and importation of more food. If income continues to increase faster than supplies, consumers likely will shift from the roots and starchy food diet to one consisting of more milk, meat, fruits, and vegetables. The results are increasing pressure on the existing price structure.

Implications for High Income Elasticities

There is evidence that population expansion by itself normally provides for a symmetrical expansion of demand for agricultural products in the sense that the demand for each agricultural commodity will expand by the same percentage as all others. However, the expansion of per capita income usually results in an asymmetrical expansion of demand. One may find, therefore, that while the demand for some commodities will rise rapidly, the demand for others will rise slowly, or even decline. In general, the foods which provide the bulk of calories and carbohydrates, such as starchy vegetables and roots, will have lower income elasticities than those which provide protein.

There are problems associated with asymmetrical growth, for this growth brings with it a planning problem because resource requirements for increasing production differ from one commodity to another. For instance, an asymmetrical growth in demand for food tends to be accompanied by an asymmetrical growth in demand for various resources used

in food production. This tends to create a problem if the resources demanded in greatest quantity are those which are particularly difficult to expand. Another problem results if a higher quality crop with its high income elasticity can be produced only under a very specific and limited set of physical conditions.

Table XXI provides the detailed data on income elasticities for a wide range of commodities. Most of the items under meat have elasticities greater than unity. Also, high elasticities for fish, milk, eggs and fruits are found.

If the increase in the production of agricultural commodities which have high elasticities of demand lags behind the expansion in demand for these commodities, their prices will increase. The impact of such price rise will be slight because the price elasticity of demand for these commodities will also be high.

Most of the agricultural commodities in Jamaica for which demand expands rapidly with income are those which are labor intensive. The most important cases are milk and vegetables. A rise in consumer incomes provide farmers a market for greater production of milk and vegetables and thereby allow much greater output and labor utilization per acre. This, in effect, raises income by providing a productive outlet for the abundant labor resources. The basic resource requirements suggest that as demand for milk expands, the farmers will, in the long run, prefer to increase domestic production, importing feed grains if necessary, rather than importing milk directly. The abundance of labor relative to the land resources suggests the wisdom of this approach.

Many of the commodities with high income elasticities are currently consumed in only very small volume and hence may have particularly complex marketing features. Problems of both bulk and perishability are important in this regard. For example, it may be very difficult to expand milk production unless adequate marketing facilities are provided.[2] Physical losses in the marketing channels for both milk and vegetables may easily depress net returns sufficiently to discourage production or raise price sufficiently to discourage consumption.

The agricultural commodities which have high income elasticities and hence high price elasticities represent important opportunities for substitution of agricultural resources for non-agricultural resources. If increases in the efficiency of the production of such commodities can be achieved, then modest price decreases can be absorbed by the producer with no decline in net revenue. Therefore, because of the relatively elastic demand for such commodities, large increases in both production and purchasing power can be absorbed.

Production Expansion Possibilities

Since Jamaica must import a large part of its food, the security of this supply must be considered. Supply is liable to interruption if exporting countries cease to export because of shortages, shipping strikes, or wars, or because the importing country lacks the means to pay on the international market.

---

[2]See the section for milk in Chapter IV.

Importing supplies from a large number of friendly countries is obviously the best security against our deficiency. This, however, is causing a serious drain on foreign currency and a persistent unfavorable trade situation. The government ought to adopt measures to encourage the production at home of a greater supply of essential foodstuffs, even though this may mean going without less essential commodities which could have been produced with the same resources.

Because of the present state of the agricultural sector and the seeming inability of the private sector to do anything to improve it, an indespensable task of the government is to promote the proper institutional framework in which the private sector can operate. The arsenal of intervention that the government has is a full one, including conventional fiscal and monetary policies, foreign exchange and import controls, compulsory government procurement of agricultural goods at fixed prices, and control of the direction of development in the industrial sector through licensing.

It is important to note that government interference in a mixed economy like Jamaica generally does not denote direct government involvment in the management of agricultural production. Government can establish extension services, encourage community development, but cannot hope to physically reach or advise the myriads of individual decision making units.

The Need for Production Credit

Jamaican agriculture is starved for capital. The banking system and other private lending agencies have, over the decades, developed credit arrangements geared mainly to the needs of commerce and industry.

The corporate financial structure makes access to new capital much more readily available to incorporated business than to non-incorporated individual or partnership enterprises, such as farms.

The small-scale, individually owner-operated or rented farm lacks access to many of these sources of capital. The farmers' most important needs for production credit require loans for a period of three to five years, since this range of time is required to liquidate the investment of most kinds of capital equipment, facilities, and livestock. Yet it is precisely this type of "intermediate" credit which is the least developed[3] or is not offered at all by private lending agencies in Jamaica.

In Jamaica, credit is not allocated according to the returns it could yield, but according to the collateral security the borrower can offer and various other considerations. Hence, the big farmers with much capital can get credit the easiest and need it the least, while the small farmer with little capital is hard put to get credit, but needs it the most.

From all indications, the pressing needs of the small farmers are for "crop loans" to enable the farmer to meet his production expenses such as the cost of improved seed, fertilizers, labor, pesticides, etc. A serious problem in Jamaica with this type of loan is that hard pressed farmers often use loans intended for productive purposes for consumptive aims such as meeting the cost of their households, of marriages, religious ceremonies, etc. Thus, many government officials and co-operative

---

[3]The most developed source of credit is the moneylender and shopkeeper source.

agricultural credit institutions have adopted the strict rule of providing credit for clearly productive purposes only.

The problem is that many farmers cannot clearly distinguish economic needs from social needs and would not attribute a higher importance to the fulfillment of the former over the latter. This is an unfortunate situation, but the scale of value of many farmers often attaches more importance to the immediate fulfillment of their social obligations than of their economic needs.

The situation will exist as long as the conditions of life and the folk-ways of the rural population do not change. It would be wiser for any agricultural credit institution to face these facts than to maintain the fallacious idea that agricultural credit should be provided for productive purposes only and thus oblige the farmer to create a pretext to obtain a loan for what he thinks are his most pressing needs. The rejection of such an application for loan, where credit could be granted, may even force the farmer into the arms of the moneylenders or village shopkeepers.

As long as the traditional farming system in Jamaica is not replaced by full-fledged market production, all credit to the small- and medium-size farmer is bound to include a consumptive, as well as, a productive element. But there is no point in trying to cut out all credit for consumptive purpose if there is sufficient repayment capacity in the farmer's budget. In other words, a loan for "cultivation expenses" should leave enough margin to the farmer to apply a part of it to other uses that are not immediately productive.

The need for medium- and long-term credit is not as urgent as that for short-term credit. This is due mainly to the fact that about

two-thirds of the land is mountainous and thus cannot use mechanized equipment that is financed by these types of credit. There are, however, many medium and large farms in dire need of longer-term credit. Medium- and long-term loans have to a larger extent than crop loans, the character of real "agricultural production credit". Credit for tractors, harvesters, implements, fencing materials, dairy equipment, etc, has a productive nature if due care is taken that it is actually utilized for the purposes for which it is supplied.

The Interest Rate Problem

Interest rates are a problem. Because of lack of proper security by farmers, commercial banks elect to play an indirect part in financing agriculture. Bank credit percolates down to the small agriculturist through traders who, in turn, may finance small merchants and shopkeepers. The usual result is that the lower the money percolates, the higher the interest rate becomes.

The predominance and strength of the money-lender, trader and shopkeeper usually is not due to the lack of financial resources and trained personnel of regular credit institutions. The weak spot of instutional credit lies in its impersonal character and all that results from it, while its strong point -- the low rate of interest -- usually constitutes the only weak point of non-institutional credit.

Non-institutional credit is personal and can therefore be obtained within a few hours. Its credit is granted without all the burden of administrative formalities inherent in institutional credit, such as detailed application forms with their numerous indiscreet questions, loan investigation, registration of deeds, disbursment of loans

in installments, in short, all the formalities which are so much disliked by the average farmer. Also, a moneylender-trader is usually lenient as to the recovery of the principal of a loan, whereas credit institutions must adhere rigidly to due dates and repayment schemes.

Moneylenders usually provide much larger loans than credit institutions because the policy they follow as to the recovery of loans guarantees full repayment. They usually take delivery of the crop at the farm shortly after the harvest thus assuring recovery of the loan. Government credit institutions, and by far the greater part of the co-operatives, grant much smaller loans and leave it to the farmer to transport his crop to the market.

In summary, some of the rigidities of institutional credit will have to be replaced for it to compete with non-institution credit. Experience has shown that farmers in developing countries may attach more value to obtaining credit without delay, discomfort and red tape, and perhaps embarrassment in accounting for the way in which loans are spent than to having to pay a fairly high rate of interest.

Recommendations and Implications

It seems obvious that the agricultural sector is in need of a strong shock to stimulate growth. But, the crucial problem remains. Who should shock the agricultural sector out of its lethargic state and set into motion the growth stimulants? Since the private sector shows no tendency to do it, then it is recommended the public sector do it. The following recommendations might be made.

1. Public Sector

In 1963, the government of Jamaica passed and implemented a five year development plan. In this plan, approximately $25 million of a total $256 million was designated to be spent on various production programs in agriculture. The impact of the programs was analyzed in 1968, at the end of the five year plan, and was found to be negligible. It has been said that the rate of investment was too small to get agriculture moving. In any event, during the period the rate of food importation reached new heights.

For development to take place, the rate of investment will have to be sufficiently large not only to increase the non-agricultural sector, but also to increase simultaneously agricultural output of sufficient volume to provide a surplus for the growing non-agricultural sector.

When an investment stimulant is effective and properly managed during a period of, say, two to three years, the entire economy should begin to feel the impact and the production of the specified crops should begin to increase. During this period, certain adjustments are necessary to enable the expansion process to proceed smoothly. Recommendations for specific crops are given below.

2. Rice

Rice, for all practical purposes, is the national food of Jamaica. There is hardly a day, especially in urban areas, that it is not served at least once. Import data[4] for the period 1964-67, show annual rice

[4]Taken from Economic Survey of Jamaica, 1967.

imports ranging from 60.4 million pounds to 73.9 million pounds. However, during the period, domestic production fell from 3.1 million pounds in 1965 to 1.6 million pounds in 1967. An analysis of the data, forces one to conclude that nothing is being done to meet the deficit. Production of rice is declining while imports remain fairly constant.

Much water and suitable land are needed for rice production and there is a deficiency of both in Jamaica. In 1960, there were 4,000 acres planted in rice and the projection for 1970 and 1975 indicates that only 6,000 acres will be planted for the period. In 1960, the production of rice was 2 million pounds and the projection for 1970 and 1975 are 8.1 million and 8.3 million pounds, respectively.

To overcome the rice deficit, however, its production should be expanded from the projected 6,000 acres to 30,000 acres[5] over the period. This expansion should be taken from sugar cane acreage, especially from Caymanas Estate where water is adequate together with land reclaimed around the Black River and the Martha Brae River. However, if the costs of bringing more lands into cultivation will result in higher rice prices to consumers, then self-sufficiency at the risk of prices higher than import price is not recommended.

3. Sugar

The price of sugar on the world market has grown less and less favorable in recent years and from all indications, the situation will get worse, especially since beet sugar is perfectly substitutable for cane sugar. Available figures show that Jamaica is a high cost producer

---

[5]The projected yield, pounds/acre is 2,350, therefore, 2,350 x 30,000 = 70,500,000 pounds per annum.

of cane sugar and has no comparative advantage in its production. Therefore, it is recommended that the area under cane be decreased by at least 50,000 acres over the projected period and used for the production of other food products. This reduction should be mostly among the small and medium size farmers. These farmers could be trained in the production of new products, especially dairy products.

4. Bananas

Bananas, like sugar, are affected by the fluctuation of world prices. Also, Jamaica is known as a high cost producer and has no comparative advantage. It faces real competition from most of the banana producing countries in the world. The acreage under production in 1960 was 155,400 and the projected acreage for 1970 is 181,818. Because of the weakness of world price and because, like sugar, many small farmers are affected severly when the world price falls or when strong winds destroy the crop, it is recommended that the area under production be reduced from the 1960 level of 155,400 acres to 100,000 acres. The surplus acreage should be used for the production of domestic crops for which the demand is high.

5. Vegetables

As indicated by both the import table and the table of projections, there is a growing market for fresh and processed vegetables. We saw that the projected production for 1970 is 120 million pounds while household demand will be 141 million pounds. With these figures in mind, it is recommended that the acreage under production should be increased substantially. Vegetables are produced mainly by small

farmers. The small farmers that cut back on the production of cane and bananas could be taught to produce vegetables. Since little attempt has been made in the past to improve the varieties or control diseases, this should be done at the same time. This means that expert assistance in improving the packaging and determining the right stage at which the fruits should be picked, is needed.

6. Root Crops

Root crops, including yams, sweet potatoes and cassava, have been making an important contribution to local supply, and recently to the export market. These crops are exported primarily to those countries where Jamaican citizens have migrated in large numbers. Because of this situation, it is recommended that the area under production be expanded. The supply and demand table shows that the 1970 projected production will be some 71 million pounds short of domestic demand. There is no accurate figure to show the past trend of production because these crops are grown in small lots. However, there are many reasons to believe that the decline in production was due to migration since migration was chiefly from small farms. Figures from the 1961 census also indicate this point.

7. Citrus

Citrus is one of Jamaica's traditional export crops. The trees are grown mainly in scattered plantings and cannot easily be enumerated. Thus, it is very difficult to ascertain the scale of production. However the supply and demand table estimates that by 1970 the total production will be 377 million pounds of which local demand will take 103

million pounds leaving 274 million pounds for export. Available data show that there is good local and foreign markets for increased production. Furthermore, the growth of supermarkets and improved packaging indicate that the local market will expand more as these services are improved. Thus, it is recommended that the area under production be expanded to about 100,000 acres. The projected area for 1970 is 80,200 acres.

8. Livestock Products

The data in the import table show that the import of meat product has been steadily increasing, while the production figures show that domestic output has remained steady. The projected supply and demand data for beef and "other meat" also show that household demand will be increasing faster than local production. The table with income elasticities indicates that meat products have high elasticities. Based on these data, it is recommended that the present area under production be increased substantially. Some of the acreage from the reduction of banana and sugar could be used for livestock production.

9. Dairy Products

Like beef products, dairy production has been lagging behind demand. Data from the import table show that imports have been increasing. Figures from the income elasticity table show that dairy products have high elasticities. Therefore, it is recommended that production be increased substantially.

10. Fertilizer

One of the main reasons why the productivity of most agricultural products in Jamaica is so low is that the natural fertility of the soil has been exhausted. It is possible to supplement fertility of many of the soil, with chemical fertilizers or with the missing trace elements essential to plant growth. Higher fertilizer applications have been found to increase profitability even on land having the greatest natural productivity.

There is no doubt that technical and economic changes in agriculture are badly needed in Jamaica which will increase farm output from a given set of conventional resources; that is, to increase the output per acre, per man, or per unit of livestock. Agriculture at the moment depends solely upon biological processes not under the control of man. It is time for more of these processes to come under the influence of human decision and action. Thus, fertilizer, better seeds, insecticides, chemicals, drainage, and irrigation, to name a few items, are capital inputs which can be substituted for land if the technical and economic conditions will justify the substitution.

While precise data relative to yield response to fertilizer application are lacking, it is known that crops which are mainly produced by peasants frequently suffer from lack of fertilizers and this is one of the main reasons why peasant production has lower yields than estate production. There has been a surprising and apparently profitable increase in the use of chemical fertilizers, in the growing of bananas. Controlled experiments in fertilizers have been conducted for sugar cane and they showed a favorable response. The larger estates and

better producers of sugar cane probably are nearing optimum fertilizer applications. Since these producers grow the larger part of the crop, it is not likely that there is as much scope for large increases in yields as in the peasant produced crops. Rice, being mainly a peasant crop, would seem to offer the greatest opportunity for increased yields through increased fertilizer expenditures. The highest fertilizer responses are in crops such as bananas, cocoa, coffee and citrus. Coconuts which are being produced with bananas on a large scale and on a few estates are receiving heavy fertilizer applications with favorable results.

Significant results also are gained through the fertilization of improved pasture. Cattle gains, which will usually double in terms of pounds per acre as between improved and unimproved pasture, often will double again as between non-fertilized and fertilized pangola grass. In Jamaica some experiments showed a live weight gain of 1,000 pounds per acre after fertilization. Such improvement through the use of fertilizer is likely to be important in increasing beef and milk production or in reducing the land area necessary for producing a given quantity of meat or milk.

11. Effective Credit

One of the main reasons why, after five years, the expenditure of $25 million was found to be ineffective in getting agriculture moving is that it was not properly supervised.[6] This expenditure was integrated largely with agricultural extension and its aim was not merely to increase agricultural production, but to be ancillary to a program

---

[6] See New Approach to Agricultural Credit: Supervised Credit Combined with Co-operatives and Agricultural Extension, FAO Development Paper No. 77, Rome, 1964.

of education which did not limit itself to teaching better methods of farming, but also to change the habits of farmers and their families in order to improve their social and economic position. The credit element involved is an instrument for reaching the targets adopted by government through the extension service.

Various reports about the misuse of funds during the period of the plan left no doubt that the insufficient integration of extension and credit was one of the major reasons why the five year program of agricultural credit had such unsatisfactory impact in Jamaica. An efficient extension service with sufficiently large and qualified staff to reach the individual farmer is indispensable if proper use is to be made of agricultural credit. Such well organized services, which form an adequate link between the research institutes and the individual farmer, seem to be the exception rather than the rule.

It was pointed out earlier that agricultural credit fulfills different functions in the successive stages of agricultural development. In the early stage, being mainly consumptive, it changes only graudally into credit for productive purposes in accordance with the degree of social, economic, and technical development into which the rural population evolves. Credit in itself cannot bring about this change. Only education in general and extension education in particular is able to accomplish the change in outlook of the farmer with regard to traditional methods of production. As long as the farmer has not learned to make a proper use of credit, any increase of the volume of agricultural credit already provided to him is likely to become an incentive to increase consumption rather than production. And as long as there is no reasonable certitude that he will actually use if for production all expansion

of the amount of credit supplied to him as a means of increasing production, may turn out to be a remedy which is even worse than the disease.

Conclusion

The aim of this thesis was to assess the role that agriculture has played in the economic development of Jamaica. After analyzing the four main contributions that agriculture ought to make in the economic development of Jamaica, it was found that the contribution was negligable and ineffective. Agriculture has released a great amount of labor for use in other parts of the economy, but it was not absorbed because the industrial sector had severe unemployment problems. As an agricultural country, Jamaica is doing a poor job of providing the food and fiber base for a nation that is growing in population. Had it not been for the high rate of food imports, there probably would be widespread starvation. It is possible that when agriculture becomes more productive, it will become a source of capital formation and even become an adequate market for some non-farm goods and services.

Although agriculture has not played an important part in the past, there is no reason why it cannot play a useful role in the future. Anytime that the importation of food starts showing a steady decline and there is no longer a need to import inputs, it should be looked upon as a sign of improvement in agriculture. If the above recommendations are utilized and improved upon, the time required for improvement will be reduced.

SELECTED BIBLIOGRAPHY

Bauer, Peter T., and Basil S. Yamey. The Economics of Underdeveloped Countries, Chicago, Illinois: The University of Chicago Press, 1963.

Central Planning Unit. Economic Survey of Jamaica, Kingston, Jamaica, 1967.

Department of Statistics. Annual Abstract of Statistics, Kingston, Jamaica, 1967.

De Wilde, John C., Chief. The Economic Development of Jamaica. Baltimore, Maryland: The John Hopkins Press, 1952.

Doww, Rhodes, and West. Economics of Agricultural Products, Markets, and Policy, Homewood, Illinois: Richard D. Irwin, Inc., 1968.

Ferguson, C.E. Macroeconomic Theory, Homewood, Illinois: Richard D. Irwin, Inc., 1966.

Heady, Earl O. Agricultural Policy Under Economic Development, Ames, Iowa: Iowa State University Press, 1962.

_____. Economics of Agricultural Production and Resource Use, Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1961.

Hathaway, Dale E. Problems of Progress in the Agricultural Economy, Chicago, Illinois: Scott, Foreman and Co., 1964.

Jones, E.L. Agriculture and Economic Growth in England, 1650-1815, London: Methuen and Co., Ltd, 1967.

Johnson, and Coley. Marketing of Agricultural Commodities for Domestic Consumption in Jamaica, Kingston, Jamaica: Ministry of Agriculture and Lands, 1966.

Kuznets, Simon. Economic Growth and Structure, New York: W.W. Norton and Company, Inc., 1965.

Lewis, W. Arthur. Development Planning: The Essentials of Economic Policy, New York: Harper and Row, 1966.

_____. The Theory of Economic Growth, London: George Allen and Unwin Ltd., 1955.

Lewis, W. Arthur. Economic Development with Unlimited Supplies of Labor, Manchester, England: The Manchester School, 1954.

Leibenstein, Harvey. Economic Backwardness and Economic Growth. New York: John Wiley and Sons, Inc., 1957.

Leftwich, Richard A. The Price System and Resource Allocation, New York: Holt, Rinehart, and Winston, Inc., 1966.

Laird, Roy D., and Crowley. Soviet Agriculture: The Permanent Crisis, New York: Frederick A. Praeger, 1965.

Meir, Gerald M. Leading Issues in Development Economics, New York: Oxford University Press, 1964.

Myint, H. The Economics of the Developing Countries, New York: Frederick A. Praeger, 1964.

Mosher, Arthur T. Getting Agriculture Moving, New York: Frederick A. Praeger, 1966.

Nurkse, Raynar. Problem of Capital Formation in Underdeveloped Countries, New York: Oxford University Press, 1967.

Schultz, Theodore W. Economic Crises in World Agriculture, Ann Arbor, Michigan: Michigan Press, 1965.

_____. Production and Welfare of Agriculture, New York: The Macmillan Co., 1949.

Snodgrass, Milton M., and Luther T. Wallace. Agriculture Economics and Growth, New York: Appleton-Century-Crafts, Division of Meredith Publishing Company, N.Y., 1964.

Southworth, Herman M., and Johnston, Bruce F. Agricultural Development and Economic Growth, Ithaca, New York: Cornell University Press, 1967.

Tekse, Kalman. Internal Migration in Jamaica, Kingston, Jamaica: Department of Statistics, 1967.

Tontz, Robert L. Foreign Agricultural Trade, Ames, Iowa: The Iowa State University Press, 1966.

Whetham, Edith H. The Economic Background to Agricultural Policy, London: Cambridge University Press, 1960.

Williams, H.T. Principles for British Agricultural Policy, New York: Oxford University Press, 1960.

VITA

R. Leslie Bennett

Candidate for the Degree of

Master of Science

Thesis: THE ROLE OF AGRICULTURE IN THE ECONOMIC DEVELOPMENT OF JAMAICA

Major Field: Agricultural Economics

Biographical:

Personal Data: Born in Kingston, Jamaica, March 29, 1939, the son of Robert and Estella Bennett.

Education: Attended Buxton High School and St. George's College, Kingston, Jamaica from 1951 to 1956; attended Oklahoma State University, Stillwater, Oklahoma in 1962; received the Bachelor of Science Degree in 1967 with a major in Agricultural Economics and a minor in Business and Marketing; engaged in graduate study toward the Master of Science Degree at Oklahoma State University; completed the requirements, May, 1969.

Professional Experience: Worked as an Excise Officer for the Collector General Office, Kingston, Jamaica, for the period 1957 to 1959; transferred and worked as a Customs Officer for the above office for the period 1959 to 1962.

Organizations: Aggie-X Club; International Relations Club; American Agricultural Economics Association, O.S.U. Soccer Club; Red, Red Rose.